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A MONOGRAPH OF THE GENUS CHLOROGALUM

Robert F. Hoover

In the summer of 1937, while collecting in the Sierra Nevada foothills of California, the writer found a plant which was at once recognized as an undescribed species of *Chlorogalum*. This discovery aroused an interest in that genus and led to a desire to obtain certain information not found in any available literature. Each species of *Chlorogalum* is very well characterized, so no need was found for extensive revision of classification in the genus, but since several interesting and important facts regarding the plants have been neglected by authors, the formulation of a general account of the genus seemed desirable.

Since the genus is distinctively Californian, the specimens in California herbaria furnished ample data on which to base descriptions and detailed statements of geographical distribution. In addition, the writer has had opportunity for extensive field study of four of the five species and has grown in cultivation large numbers of the commonest species over a period of several years.

The earlier authors, basing their classification almost entirely on the features evident in dried specimens, showed wide disagreement as to the position of *Chlorogalum* in the Liliaceae. It has been regarded as closely related to genera of various remote regions with climates differing extremely from that of California.

J. G. Baker (2) took *Chlorogalum,* together with *Bowiea* and *Nolina,* to constitute a tribe Chlorogaleae, which he distinguished from the tribe Scilleae by the paniculate rather than racemose inflorescence. The weakness of this distinction as marking two tribes is shown by the presence of both racemose and paniculate inflorescences in *Schoenolirion.* Furthermore, to one familiar with the plants under their native conditions of climate and soil, *Chlorogalum* seems out of place when regarded as a close relative of either *Bowiea* or *Nolina.* So different are those genera in manner of growth and in habitat that one instinctively seeks elsewhere for the natural relationships of *Chlorogalum.*

In a revision of the North American Liliaceae, Sereno Watson (5) considered *Chlorogalum* with "*Schoenolirion*" and *Hastingsia* as composing a subtribe Chlorogaleae of the tribe Phalangieae, the tribe to which *Camassia* was referred in Watson's classification. In the following discussion the name *Schoenolirion* signifies the two western species, *S. album* Dur. (*Hastingsia alba* Wats.) and *S. bracteosum* (Wats.) Jepson (*Hastingsia bracteosa* Wats.).

The possible relationship of Watson's Chlorogaleae to the Asphodeloideae was first indicated by Bentham and Hooker in their "Genera Plantarum." A similar conclusion was reached by Engler (3), who in the "Natürlichen Pflanzenfamilien" places

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Madroño, vol. 5, pp. 137–176. January 13, 1940.

Chlorogalum with *Schoenolirion* (used in the sense of Watson but also including *Hastingsia*) and *Hemiphylacus* in the subtribe Chlorogalinae of the tribe Asphodeleae, subfamily Asphodeloideae. This subtribe is placed next to the Odontostominae, consisting of the monotypic Californian genus *Odontostomum*, which probably is related to *Chlorogalum*. However, the only tangible difference in Engler's classification between the Asphodeloideae and the tribe Scilleae of the subfamily Lilioideae is evidently in the "rhizome" of the former as contrasted with the bulb of the latter. In this regard, *Chlorogalum* is definitely out of place with *Hemiphylacus*, which has "lang-knollige Wurzeln," but evidently is related to *Schoenolirion*, which has bulbs much like those of *Chlorogalum*. It is not clear why Engler regarded these bulbous genera as belonging to the Asphodeloideae, especially in view of his placing the evidently related genus *Camassia* in the Scilleae.

Chlorogalum is one of several bulbiferous liliaceous genera which are characteristic of California. All of the five species of the genus occur principally within that state, and only two extend beyond its borders, *C. pomeridianum* being found in southern Oregon and *C. parviflorum* in northern Baja California, Mexico. Within this region all of the species are confined to the cismontane areas and to relatively low altitudes. The plants are adapted to a climate characterized by a rainy season, when growth of leaves and roots takes place, and a dry season, when flowering and fruiting occur, leaves and roots wither, and the bulb is protected from excessive drying by the thick coats.

The genus is so markedly characterized by its adaptation to the conditions of a particular region that the writer believes its closest natural relationships are to be found in other western North American genera similar in vegetative features, inflorescence, and flower structure. Four genera seem rather closely related to *Chlorogalum: Odontostomum, Hesperocallis, Schoenolirion,* and *Camassia*. The fact that *Odontostomum* is characteristic of the same geographic region and is strikingly similar to the smaller *Chlorogalum* species in habit suggests a similar ancestry, but that genus is quite distinct in several features of undoubted importance. *Hesperocallis* seems somewhat nearer to *Chlorogalum* in morphological characters, but differs in its much larger tubular perianth with the nerves of the segments more numerous. Its geographic range is also separated, though not widely, from that of *Chlorogalum*.

Camassia and *Schoenolirion* appear to be closer to *Chlorogalum* than are any other genera. That Californian botanists previously have been led to similar conclusions is indicated by the position of *Chlorogalum* near *Schoenolirion* and *Camassia* in both Jepson (4), "Flora of California" and Abrams (1), "Illustrated Flora of the Pacific States." *Chlorogalum* seems to be about equally related to these two genera. The paniculate rather than racemose inflorescence and the small number of seeds suggest a closer affinity with *Schoenolirion.* However, that genus has a perianth which becomes scarious in fruit, a feature found in neither *Chlorogalum* nor *Camassia,* while in all species of *Chlorogalum* and some of *Camassia,* unlike *Schoenolirion,* the perianth-segments are twisted together over the ovary after anthesis. The present writer considers *Chlorogalum* as a typical member of the Scilleae as that tribe is defined by Engler (3), although it simulates certain species of *Asphodelus* to a remarkable degree.

The species of *Chlorogalum* form a distinct natural group separable from *Schoenolirion* by the non-scarious perianth-segments which become twisted together over the ovary, and from the other closely related genus, *Camassia,* by the one or two seeds in each locule and by the paniculate inflorescence. It is notable that both *Schoenolirion* and to a less extent *Camassia* tend to grow in situations which are wet, at least during the growing season, while no *Chlorogalum* has been observed in places which are subject to flooding at any time.

Each species of the genus is remarkably uniform in certain characters. Only *Chlorogalum pomeridianum,* the commonest and most widely distributed species, exhibits sufficient variation to permit, in the opinion of the writer, the segregation of varieties. No plants have been seen which could not be referred with assurance to one of the five species. While the range of *C. pomeridianum* overlaps that of all the other species in a broad way, detailed field studies show that any two species of the genus are very seldom actually associated. So far as known to the writer, only *C. pomeridianum* and *C. angustifolium* ever grow together. Where the two have been seen together, no plants were found which indicated hybridization. The delimitation of the species is thus subject to none of the difficulties of interpretation encountered in many genera.

On the basis of the characters of the bulb, the species can be divided into two groups. One group consists of a single species, *C. pomeridianum,* which has thick bulb-coats composed of very tough coarse fibers. The remaining four species all have thinner membranous bulb-coats with delicate fibers more or less developed. The characters of *C. grandiflorum,* a species evidently closely related to *C. pomeridianum,* indicate that the nature of the bulb-coat is of subordinate importance as an indication of phylogenetic relationship.

The number of ovules in each of the three locules of the ovary is probably always two. As known to the writer in the field, *Chlorogalum pomeridianum, C. grandiflorum,* and *C. angustifolium* invariably have two ovules in each locule. The same is true of *C. purpureum,* but in that species some of the ovules always fail to develop into seeds, a fact which has led to the statement in the original description that there is only one ovule in each cell. Certain herbarium specimens of *C. pomeridianum* and *C. parvi-*

florum seem to show a variable number of seeds, from three to six in each capsule. This is probably a result of failure of some of the ovules to develop rather than an indication of reduction in their number.

It is notable that the species are definitely divided into two groups in regard to flowering, three being vespertine and two diurnal. It is evidently no mere coincidence that the two diurnal species, *C. parviflorum* and *C. purpureum*, are also distinguished by having small flowers with the style longer than the perianth. These differences are so correlated with some difference in general aspect that one is led to suspect that the genus as accepted is composed of two separate lines of descent. At any rate, the two groups of species are so much alike morphologically and so close geographically that their inclusion in a single genus is quite consistent with any generally accepted classification of the Liliaceae.

Apparently only one method of vegetative reproduction occurs in the genus; namely, longitudinal splitting of the bulbs. This is seen frequently in *C. pomeridianum* but is unusual in the other species, reproduction being accomplished almost entirely by seeds. Under conditions of cultivation, *C. pomeridianum* begins to flower from five to seven years after germination of the seeds. It is to be expected that the smaller species require less time to reach maturity.

Although the plants with their large clumps of leaves are of interest in the garden, the flowers of most species of *Chlorogalum* are not sufficiently showy to make them desirable for cultivation. The low-growing coastal variety of *Chlorogalum pomeridianum* is a very attractive plant, however, with the delicate white flowers produced abundantly on the low spreading branches. *Chlorogalum purpureum* is also a beautiful species, with its small blue flowers remaining open all day.

The herbaria where cited specimens are located are indicated as follows: California Academy of Sciences (CA), R. F. Hoover (at present in possession of the writer) (H), Dudley Herbarium, Stanford University (S), University of California, Berkeley (UC), Vegetation Type Map Herbarium, California Forest and Range Experiment Station, Berkeley (VT). For the privilege of studying these specimens, the writer expresses his gratitude.

In the following descriptions the term "stem" is intended to include the axis of the panicle, because the inflorescence is not sharply differentiated from the main stem.

Systematic Treatment

Chlorogalum Kunth, Enum. Pl. 4: 681. 1843; Watson, Proc. Am. Acad. 14: 242. 1879, and Bot. Cal. 2: 159. 1880; Intern. Rules Bot. Nomen. 75. 1906 (*nomen conservandum*); Jepson, Fl. Cal. 1: 269. 1922. *Laothöe* Raf., Fl. Tellur. 3: 53. 1836;

Greene, Leafl. Bot. Obs. 1: 90. 1904; Abrams, Ill. Fl. Pac. St. 1: 413. 1923.

Perennial herbs with tunicated bulbs and paniculate inflorescence. Basal leaves several, linear, elongated, radiately spreading; cauline leaves much reduced, the upper scarious. Pedicels scattered or approximate at intervals along the branches of the panicle, each subtended by a small scarious bract. Perianth white to pink or blue, the segments linear to oblong, persistent in fruit and twisted together above the capsule, with darker mid-vein of three nerves, the separate nerves often obscure. Anthers versatile, on filiform filaments. Style filiform, slightly three-cleft at apex. Fruit a loculicidal capsule, subglobose, often somewhat stipitate. Seeds black, rounded, one or two in each locule.

Type species. *Chlorogalum pomeridianum* (DC.) Kunth.

KEY TO THE SPECIES

- Flowers vespertine; style equalling or shorter than perianth; perianth-segments 8–30 mm. long.
  - Leaves strongly undulate, 4–25 mm. broad; perianth-segments linear, 15–30 mm. long.
    - Bulb-coats of coarse tough fibers (except in variety); pedicels 5–35 mm. long; style 10–15 mm. long, shorter than perianth . . . . 1. *C. pomeridianum.*
    - Bulb-coats membranous with delicate fibers; pedicels 2–5 mm. long; style 18–28 mm. long, about equalling perianth . . . . 2. *C. grandiflorum.*
  - Leaves plane or slightly undulate, 2–5 mm. broad; perianth-segments oblong, 8–12 mm. long . . . . 3. *C. angustifolium.*
- Flowers not vespertine; style exceeding perianth; perianth-segments 5–8 mm. long; leaves strongly undulate.
  - Bulb-coats dark brown; pedicels averaging shorter than flowers; perianth white or pink . . . . 4. *C. parviflorum.*
  - Bulb-coats (except the outermost) whitish; pedicels averaging as long as flowers; perianth deep blue . . 5. *C. purpureum.*

1. CHLOROGALUM POMERIDIANUM (DC.) Kunth, Enum. Pl. 4: 682. 1843. *Scilla pomeridiana* DC., Cat. Hort. Monsp. 143. 1813; Redouté, Les Liliacées 8: pl. 421. 1816. *Anthericum pomeridianum* Ker, Bot. Reg. 7: pl. 564. 1821. *Phalangium pomeridianum* Sweet, Hort. Brit. ed. 1, 416. 1827; Don in Sweet, Brit. Fl. Gard. ser. 2, pl. 381. 1837. *Laothòe pomeridiana* Raf., Fl. Tellur. 3: 53. 1836.

Bulb 7–15 cm. long, the parenchymatous tissue of the outer scales early disintegrating, leaving heavy dark brown coats of coarse tough fibers which project in a sheathing tuft around the base of the leaves and stem; leaves 6–25 mm. wide, strongly undulate; stem stout, 5–25 dm. tall, with ascending or spreading branches above the base; pedicels slender, of variable length, 5–35 mm. long, on the average about equalling the flowers; perianth-segments linear, 15–23 mm. long, white with purple or greenish mid-vein, at anthesis spreading and recurved; anthers about 2 mm. long; style 10–15 mm. long, definitely exceeded by the perianth; capsule 5–7 mm. long, short-stipitate; ovules 2 in each locule.

Josephine County, Oregon, to San Diego County, California, west of the Sierra Nevada crest, up to 5000 feet altitude.

Oregon. Josephine County: 5 miles north of Grants Pass, *Abrams 8679* (S); 4 miles east of Applegate River on Grants Pass—Crescent City road, *Kildale 8211* (S); Waldo, *Applegate 7320* (S). Jackson County: hills east of Brownsboro, 1927, *Heckner* (S). California. Siskyiyou County: trail up South Fork Indian Creek to Elk Lick, *Kildale 8651* (S). Humboldt County: Hupa Valley, *Goddard 44* (UC); Willow Creek, *Abrams 7191* (S), *7173* (S). Mendocino County: near Handley's, *McMurphy 172* (S); Willits, 1906, *Clark* (CA); Cloverdale—Hopland road, *Abrams 8104* (S). Lake County: Mt. Konocti, 1928, *Blankinship* (CA). Sonoma County: mountains west of Calistoga, 1894, *Kraus* (S); west of Windsor near Russian River, *Heller 5781* (CA, S). Solano County: Little Oak, 1884, *Jepson* (UC); Benicia, *Eastwood 10503* (CA). Marin County: Mt. Tamalpais, *Mulliken 72* (UC). Nevada County: Nevada City, *Eastwood 566* (CA). Placer County: Gold Run, 1925, *Mitchell* (CA). Amador County: New York Falls, *Hansen 41* (UC); Agricultural Station, *Hansen 41* (S); 3 miles west of Ione, *Hoover 2411* (H); Blakely, *Belshaw 2464* (VT). Calaveras County: Gwin Mine, 1902, *Jepson* (UC); Mokelumne Hill, *Blaisdell* (CA); Camp Baxter, 1930, *Jussel* (CA). Tuolumne County: Rawhide, *Stinchfield 101* (S); Mountain Pass, *Hoover 2440* (H); near Chinese Camp, 1889, *Lemmon* (UC); hill above Muir Gorge, 1919, *Clemens* (CA). Stanislaus County: Arnold, *Carlson 292* (VT). Merced County: Merced, *Hoover 617* (H). Mariposa County: Wawona, *J. T. Howell 173* (CA). Madera County: The Pines, Bass Lake, *Abrams 4974* (S). Tulare County: Badger, 1892, *T. Brandegee* (UC); Eshom Creek Redwoods, *Dudley 1384* (S). Contra Costa County: Byron Springs, *Eastwood 11434* (CA). Alameda County: North Berkeley Hills, *Walker 610* (UC). San Mateo County: Woodside, 1919, *Walther* (CA). Santa Clara County: Black Mountain, *Elmer 4563* (CA, S, UC); foothills west of Los Gatos, *Heller 7513* (UC). Santa Cruz County: Santa Cruz Mountains, *Davis 114* (UC). Monterey County: Pajaro Hills, *Chandler 432* (UC). San Luis Obispo County: 4 miles southeast of Huerhuero School, *Lee 1053* (VT); San Luis Obispo, 1908, *Condit* (UC). Kern County: 10.5 miles west-northwest of Liebre Twins, *Simontacchi 40* (VT). Santa Barbara County: Prado Ranch, 1913, *Newell* (CA). Ventura County: Conejo Mountain, *Gifford 218* (VT). Los Angeles County: Sierra Madre, *Abrams 2634* (S). San Bernardino County: "foothills," 1888, *Parish* (S). Orange County: Laguna, *Abrams 1782* (S). San Diego County: Escondido, *Meyer 238* (UC).

Chlorogalum pomeridianum was very early introduced into cultivation in Europe. The original description of *Scilla pomeridiana*

DC. was based on a plant growing in the botanic garden at Montpellier, France. Its native country was not known, but the illustration in Redouté's "Les Liliacées" clearly represents the species under consideration.

This species grows on open hills or plains, or less often, in woods and is common in diverse types of soil over much of the California hill country. Its range is more nearly continuous than collections would indicate. For example, it is common in the Sierra Nevada foothills of Fresno County, though it apparently has not been collected there. Collectors often neglect this species, not because it is inconspicuous, but because the large bulbs and the succulent evanescent flowers make it difficult to prepare good specimens. In warm dry localities the flowering season begins before the end of May, while in the coastal fog-belt it may extend even into September. The properties of the bulbs, which account for the common name "soap plant," are well known.

The flowering habits of this species are worthy of note. Each flower opens only on one day, and then only for a few hours. The flowers burst open suddenly about four o'clock in the afternoon and before nightfall are visited by bees in large numbers. Shortly after dark the perianth-segments fold together and become deliquescent.

1a. CHLOROGALUM POMERIDIANUM var. **divaricatum** (Lindl.) Hoover, comb. nov. *Ornithogalum divaricatum* Lindl., Bot. Reg. n. ser. 4: 54. 1841; *l.c.* 5: pl. 28. 1842. *Chlorogalum divaricatum* Kunth, Enum. Pl. 4: 682. 1843. *Laothöe divaricata* Greene, Leafl. Bot. Obs. 1: 91. 1904.

Stem with widely divaricate branches from the base, 3–6 dm. long and not over 3 dm. high.

Immediate vicinity of the coast in middle California, from Sonoma County to Monterey County.

CALIFORNIA. Sonoma County: Bodega Point, *Eastwood 4892* (CA). San Francisco County: Bay View Hills, *Eastwood 354* (CA); Mt. Davidson, *Eastwood 11431* (CA). Santa Cruz County: Swanton, 1912, *Rich* (S). Monterey County: Pacific Grove, 1905, *Coleman* (S); Cypress Point, *Abrams 7315* (S); Point Lobos, *McGregor 52* (S).

Ornithogalum divaricatum was described from a plant grown from a bulb obtained "on the coast of California by Mr. Hindes of the Sulphur exploring expedition." It is here identified with the localized coastal variety of *Chlorogalum pomeridianum* on the basis of the terms in the original description "panicled from the base" and "with straggling branches," distinctive features of this variety.

Although not considered worthy of mention by the more recent authors, the variety *divaricatum* seems genetically distinct from typical *C. pomeridianum*. When the typical form, as represented by plants from the Santa Cruz Mountains, and the variety, as represented by plants from the Monterey Peninsula, were grown together in the garden over a number of years, each retained its characteristic habit and produced only its own kind from seed. Under garden conditions var. *divaricatum* flowers nearly a month earlier than typical *C. pomeridianum,* but its humid coastal habitat prevents early flowering under natural conditions. Because of its compact habit and consequently less scattered flowers, it is a more attractive plant than typical *C. pomeridianum.*

1b. CHLOROGALUM POMERIDIANUM var. **minus** Hoover, var. nov.

Tunicis bulbi plerumque membranaceis; caule erecto, 3 ad 4 dm. alto.

Bulb-coats mostly membranous, with few coarse fibers; stem erect, 3–4 dm. tall.

Foothills above Paskenta, Tehama County, California, on the road to Covelo, in area of serpentine rocks in the chaparral belt, *Hoover 4104* (UC 618191, type). This variety, which probably occurs at other localities in the inner North Coast Ranges, was mentioned under the original description of *C. grandiflorum* as possibly belonging to that species. Although the small size of the plant and the less fibrous bulb-coats suggests a relationship to *C. grandiflorum,* this variety is shown by the size of the flowers and the length of the pedicels to belong to *C. pomeridianum.*

2. CHLOROGALUM GRANDIFLORUM Hoover, Leafl. West. Bot. 2: 128. 1938.

Bulb 5–7 cm. long, with dark brown membranous coats, the outer coats with delicate fibers; leaves 4–12 mm. wide, undulate; stems 3–6 dm. tall, with ascending or spreading branches; pedicels stout, 2–5 mm. long; perianth-segments linear, 20–30 mm. long, white with purple mid-vein, at anthesis spreading and recurved; anthers 3 mm. long; style 18–28 mm. long, about equalling the perianth, often slightly exserted after anthesis; capsule 5–8 mm. long, short-stipitate.

Sierra Nevada foothills in Tuolumne County, California, at about 1500 feet altitude.

CALIFORNIA. Tuolumne County: 3 miles north of Keystone, *Hoover 2364* (UC, type, CA, H, S); 3 miles south of Chinese Camp, *Hoover 2558* (H, UC).

This localized species grows in rocky places on openly wooded and brushy hills and appears to be confined to serpentine rocks. It is clearly a close relative of *C. pomeridianum,* although its bulb-coats are more like those of the other species. The flowers are noticeably larger than in any other *Chlorogalum* but are approached in size by those of *C. pomeridianum.* The flowers, which appear in May and June, are vespertine as in that species.

3. CHLOROGALUM ANGUSTIFOLIUM Kell., Proc. Cal. Acad. 2: 104, fig. 30. 1863. *Laothoë angustifolia* Greene, Leafl. Bot. Obs. 1: 91. 1904.

Bulb 3–5 cm. long, with reddish brown membranous coats, the coats with very delicate fibers; leaves 2–5 mm. wide, not strongly undulate; stem 3–7 dm. tall, with ascending branches; pedicels slender, 2–3 mm. long; perianth-segments white with greenish yellow mid-vein, oblong, 8–12 mm. long, at anthesis ascending at base and spreading above; anthers 1.5 mm. long; style 3–4 mm. long, included; capsule 4–5 mm. long, sessile or with a very short stipe.

Interior of California, at altitudes of 50 to 1500 feet, from Shasta County southward to Lake County in the Coast Ranges, and to Fresno County on the east side of the Great Valley and in the lower foothills of the Sierra Nevada.

CALIFORNIA. Shasta County: mesas near Redding, *Hall and Babcock 4003* (S, UC). Tehama County: 4 miles south of Cottonwood, *Hoover 1180* (H); between Red Bluff and Payne's Creek, *Eastwood and Howell 1848* (CA); Red Bluff, 1884, *Gans* (S). Glenn County: Artois, *Eastwood and Howell 1885* (CA); Stony Creek, 1884, *Rattan* (S). Mendocino County: hills near Covelo, *Eastwood 15177* (CA, UC). Lake County: Kelseyville, 1928, *Blankinship* (CA); between Clear Lake and Lower Lake, *Kildale 2066* (S). Butte County: 7 miles north of Chico, *Hoover 1167* (H); near Clear Creek, *Heller 11400* (S, UC); plains west of Pentz, *Hall 10302* (CA, UC). Sutter County: Marysville Buttes, *Heller 11400* (CA); Pleasant Grove, *Hoover 2219* (H). Eldorado County: Blue Ravine, 1907, *K. Brandegee* (UC). Amador County: vicinity of Ione, *Braunton 1005* (UC); 3 miles west of Ione, *Hoover 2407* (H). Calaveras County: near Valley Springs, *Stanford 419* (S); near Jenny Lind, *Stanford 995* (S); Wallace 1914, *McMurphy* (S); Milton, *Davy 1229* (UC). Stanislaus County: Knight's Ferry, *Hoover 1027* (H); Warnerville, *Hoover 1041* (H). Merced County: 4 miles south of Snelling, *Hoover 2066* (H); 5.5 miles south-southwest of Snelling, *Belshaw 2011* (VT). Fresno County: Pinedale, *Hoover 986* (H), *3458* (H).

Chlorogalum angustifolium was described from cultivated plants collected at "Shasta" by Veatch. This locality is probably the old settlement of Shasta near the present city of Redding. The plants grow on open rolling hills or plains, never among trees or bushes. The preferred type of soil is a red gravelly clay which is baked as hard as brick during the heat of early summer. The flowering season is from late April to early June. The plants occur in large numbers in many localities but are inconspicuous except in the late afternoon, when the flowers are open.

4. CHLOROGALUM PARVIFLORUM Wats., Proc. Am. Acad. 14: 243. 1879. *Laothòe parviflora* Greene, Leafl. Bot. Obs. 1: 91. 1904.

Bulb 4–7 cm. long, with dark brown membranous coats; leaves 3–9 mm. wide, undulate, roughened in appearance but not scabrous to the touch; stem 3–9 dm. tall, the branches divaricate;

pedicels often two or more in the axil of each bract, slender, 2–8 mm. long, mostly shorter than the flowers; perianth white or light pink, the segments with dark mid-vein, 7–8 mm. long, apparently sub-rotate; anthers 1.5 mm. long; style 7–9 mm. long, exceeding the perianth; capsule about 4 mm. long, sessile or nearly so, with one or two seeds in each locule.

Western Riverside County, California, to extreme northern Baja California, Mexico, from near sea level to altitudes of about 2000 feet.

CALIFORNIA. Riverside County: Menifee, 1897, *Ella Foster* (*Hall 534*) (UC). San Diego County: Oceanside, *Parish 4444* (S); dry ridges between Ramona and Ballena, *Abrams 3779* (CA, S); near Alpine, *Abrams 4897* (S); Alpine, 1904, *T. Brandegee* (S, UC); Chollas Valley, 1895, *Stokes* (S); 10 miles east of San Diego, *J. T. Howell 6635* (CA); San Diego, *Hall 7455* (S, UC); east of Julian, 1926, *Jones* (S). BAJA CALIFORNIA. San Ysidro, *Schoenfeldt 3803* (S); hills southwest of Valle Redondo, *Fosberg 8388* (S).

The specimen on which the description of *Chlorogalum parviflorum* was based was collected in El Cajon Valley, San Diego County by Cleveland. The flowering season of this species is in May and June. According to information received from Mr. Frank F. Gander of the San Diego Natural History Museum, the flowers were open in the morning on a cloudy day. Since the weather has little effect on the flowering of the species which are familiar to the writer, it may be concluded that *C. parviflorum* is diurnal in flowering. The note "flowers open in morning" also accompanies the specimens of *Hall 7455* cited above.

5. CHLOROGALUM PURPUREUM Brandegee, Zoe 4: 159. 1893. *Laothöe purpurea* Greene, Leafl. Bot. Obs. 1: 91. 1904.

Bulb 2.5–3 cm. long, the outer coat brown, readily separating, containing some delicate fibers, the inner coats white, wholly membranous; leaves undulate, 2–5 mm. wide; stem 2.5–4 dm. tall, with few ascending branches; pedicels slender, 4–10 mm. long, mostly longer than the flowers; perianth deep blue, the segments 5–7 mm. long, recurved; anthers yellow, 1 mm. long; style 5–6 mm. long, exserted; capsule 3 mm. long, short-stipitate.

East side of the Santa Lucia Mountains in Monterey County, California, known only from the vicinity of Jolon at about 1000 feet altitude.

CALIFORNIA. Monterey County: Milpitas Ranch, 1897, *Eastwood* (S); plain west of Jolon, 1895, *Dudley* (S); near Jolon, *J. T. Howell 6535* (CA), *Hall 10019* (UC), *Hoover 4076* (CA, S, UC), *4120* (UC), 1893, *Eastwood* (UC, type).

This very distinct and very local species most closely resembles *C. parviflorum* in most features, although far removed from it geographically. This fact suggests the possibility that the two species may be, from the standpoint of geological history, relictual descendents of a more widely distributed ancestral form. The collection made by Vortriede in 1892, which is cited first in connection with the original description of *Chlorogalum purpureum,* apparently has been lost. Under the circumstances, it seems logical to accept the Eastwood collection of 1893, on which it is evident that the description was mainly based, as the type.

Excluded Species

Chlorogalum Leichtlinii Baker, Gard. Chron. ser. 2, 1: 689. 1874. = Camassia Leichtlinii (Baker) Wats., Proc. Am. Acad. 20: 376. 1885.

Department of Botany,
University of California, Berkeley,
November, 1938.

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NOTES ON DRABA IN THE SIERRA NEVADA

Carl W. Sharsmith

Field and herbarium studies upon the alpine vascular flora of the Sierra Nevada of California have been carried on by the writer during the past several years. In these studies certain observations on the perennial scapose species of the genus *Draba* have been made which are herein recorded.

Draba asterophora Pays. Am. Journ. Bot. 4: 263. 1917.

Draba asterophora has not been recorded in the literature as occurring in California. Mount Rose, Washoe County, Nevada, the type locality, was the sole station known to Payson for the species. This mountain, which adjoins the Lake Tahoe area, is geologically and topographically a part of the Sierra Nevada, and the existence of *D. asterophora* in the latter range adjacent to Mount Rose is to be expected. The collections now available for this species extend the known range slightly into California, but still indicate its apparent restriction to the alpine region adjacent to Lake Tahoe on the east and south.

Draba asterophora is distinct in the field. The obovate to oblanceolate leaves are thick and almost fleshy and are thus readily distinguishable from those of the related *D. Lemmonii,* from which species *D. asterophora* differs also in its cruciform rather than simple trichomes, and in its definitely winged rather than wingless seeds. In the region of Jobs Sister Peak just south of Lake Tahoe, *D. asterophora* appears to replace *D. Lemmonii* ecologically.

The following collections of *Draba asterophora* are all deposited in the University of California Herbarium.

NEVADA. Washoe County: Mount Rose, 9000 feet (indicated as up to 10,800 feet on a duplicate collection), *Kennedy 1154* (isotype); Contact, Mount Rose, 9000 feet, *Heller 10940*. CALIFORNIA. Eldorado County: Jobs Sister, 10,000 feet, July 28, 1918, *H. M. Evans;* Cup Lake (exact location dubious but probably in the vicinity of Jobs Sister), July 21, 1918, *H. M. Evans;* above Star Lake (on Jobs Sister), July 11, 1920, *H. M. Evans;* Jobs Sister, 10,000 feet, *C. W. Sharsmith 3503;* saddle between Jobs Peak and Freel Peak, *C. W. Sharsmith 3502;* north slope of Freel Peak, 10,200 feet, *C. W. Sharsmith 3472.*

DRABA GLOBOSA Pays, var. SPHAERULA (Macbr. & Pays.) O. E. Schulz, Pflanzenreich 4^{105}: 103. 1927. *D. sphaerula* Macbr. & Pays. Am. Journ. Bot. 4: 258. 1917.

Collections of the dwarf, cespitose, scapose species of *Draba* from the alpine Sierra Nevada south of Lake Tahoe, particularly those of *D. oligosperma* Hook., have almost invariably contained an admixture of *D. globosa* var. *sphaerula*. The existence of *D. globosa* var. *sphaerula* in this region, however, has never been recognized. This variety is distinct from other alpine representatives of the genus which occur in the Sierra Nevada south of the Tahoe section in that it possesses linear, glabrous, ciliate-margined leaves, yellow petals, and flattened silicles. Occasionally, in addition to cilia, the leaves have a few simple trichomes on both surfaces near the apex, but these trichomes are never stellate or branched. Payson and others have pointed out the diagnostic value of the leaf trichomes in *Draba*. This character furnishes a reliable criterion for distinguishing the perennial scapose species of the alpine Sierra Nevada.

Under *Draba globosa* var. *sphaerula*, Schulz (*op. cit.*) lists *D. vestita* Pays., *partim,* and *D. Paysonii* Macbr. as synonyms. Both of these names should be excluded from the synonymy: *Draba vestita* Pays. is a homonym of *D. vestita* Davidson, this latter being a synonym of *D. corrugata* Wats., and the plants referred to in *D. vestita* Pays. are properly included in *D. Paysonii* Macbr. (Contr. Gray Herb. n. ser. 56: 52. 1918). *Draba Paysonii* is a valid species, characterized by having branched or stellate trichomes in addition to cilia on the leaves, and is related, by the character of the trichomes at least, to *D. densifolia* Nutt.

Schulz, in the same treatment, lists *Draba glacialis* var. *pectinata* Wats., *partim,* as a synonym under *D. globosa.* Following Payson (*op. cit.,* 260), *D. glacialis* var. *pectinata* Wats. (Proc. Amer. Acad. 23: 260. 1888) and *D. pectinata* Rydb. (Bull. Torr.

Bot. Club 39: 327. 1912) "seem according to specimens labeled by Rydberg in the Gray Herbarium to be referable to *D. oligosperma*." Thus the identity of *D. glacialis* var. *pectinata* appears uncertain despite the fact that both Watson's and Rydberg's descriptions are in large part correct for *D. globosa*. Acceptance of Payson's decision clarifies the conception of *D. globosa*, and restricts its meaning to those plants which have linear, glabrous (or glabrate) leaves with ciliate margins.

The relationship of *Draba globosa* is thus close to *D. Nelsonii* Macbr. and Pays., both species possessing linear, glabrous leaves with ciliate margins. The occurrence of *D. Nelsonii* in the Tahoe region of the Sierra Nevada and northward has been indicated by Payson (*op. cit.*, 259, "Mount Stanford, Nevada County, July, 1892, *Sonne 14;* Castle Peak [Mount Stanford], Nevada County, August 3, 1903, *Heller;* Modoc County, 1898, *Mrs. Bruce*"). In addition to the Sonne collection cited above, there are in the University of California Herbarium two other Sonne collections of *D. Nelsonii* from Mount Stanford, made in 1884 and 1897 respectively. Jepson (Fl. Calif. 2: 97. 1936) erroneously refers two of these (probably the latter two) to *D. oligosperma*.

Apparently *Draba globosa* is represented in the alpine Sierra Nevada only by the variety *sphaerula*. If close genetic connection of this group with *D. Nelsonii* be assumed, the Sierran representative of *D. globosa*, in the form of var. *sphaerula*, may be interpreted as a partial derivative of *D. Nelsonii*, from which it differs in being more strictly alpine with consequent nanism.

Representative material of *Draba globosa* var. *sphaerula* (all deposited in Herb. Univ. Calif.) follows: CALIFORNIA. Eldorado County: Freel Peak, *C. W. Sharsmith 3489*. Mono County: Lundy Trail, Mount Warren, 12,000 feet, August 21, 1894, *J. W. Congdon;* between Tower Peak and Saurian Crest, *C. W. Sharsmith 3726;* between Leevining Peak and Mount Warren, 11,400 feet, *C. W. Sharsmith 2818;* Dana Plateau, east of Mount Dana, 12,000 feet, *C. W. Sharsmith 2420, 2443*. Tuolumne County: pass between Mount Dana and Mount Gibbs, 11,000 feet, September, 1897, *J. G. Lemmon* (U.C. 10482 in part, as to plant with glabrous, ciliate-margined leaves); summit of Mount Dana, July, 1901, *H. M. Evans;* northwest plateau of Mount Dana, 11,450 feet, *C. W. Sharsmith 265*.

Draba sierrae sp. nov. Herba perennans caespitosa, caudicis ramis tenuibus elongatis; folia anguste oblonga oblanceolatave obtusa obtusiusculave, 2.0–6.5 mm. longa, leviter uninervata, dense imbricata in aetate albida marcescentia, dense puberula, trichomatibus ramosis adscendentibus, 0.1–0.5 mm. longis; scapi puberuli, floribus racemosis; sepala ovalia obovatave puberula, 2.0–3.5 mm. longa; petala spatulata, lutea, 4–5 mm. longa; siliculae puberulae 3.5–7.0 mm. longae, plerumque asymmetricae contortae; styli 0.5–1.0 mm. longi.

Perennial cespitose herb branching from a shallowly to deeply rooted caudex, branches numerous, slender and elongate (usually less than 1 mm. in diameter) with lower portion stramineous; leaves with an evident but not strongly developed midnerve toward the base or sometimes extending to the apex, narrowly oblong to oblanceolate, obtusish to obtuse, 2–6.5 mm. long, densely imbricated on the slender stems, marcescent-persistent, tissue of the dead leaves fading whitish, densely puberulent on both surfaces with minute branching trichomes 0.1–0.5 mm. long, trichomes longest on the basal margins, their branches few and usually ascending; flowering stems usually scapose, numerous, 1.5–4 cm. long, puberulent with trichomes as on leaves; inflorescence short-racemose, elongating slightly in fruit; pedicels 2–5 mm. long; sepals oval to ovate or obovate, 2–3.5 mm. long, pale greenish-yellow, dorsally sparsely and minutely puberulent with trichomes as on leaves; petals spatulate, entire, 4–5 mm. long, cadmium to light cadmium yellow, fading to naphthalene yellow[1] (yellowish-white); silicles predominantly lanceolate, occasionally ovate or orbicular, 3.5–7 mm. long, once or twice twisted or at least undulate, usually contorted and more or less strongly asymmetric, uniformly puberulent with trichomes as on leaves; styles 0.5–1 mm. long; seeds 1 mm. long, wingless.

Type. In unglaciated granitics on summit of divide leading to Mount Mills from Mono Pass at head of Rock Creek, altitude 12,500 feet, Sierra Nevada, northwestern Inyo County, California, August 8, 1937, *C. W. Sharsmith 3058* (Herb. Univ. Calif. no. 624298); isotypes at Gray, Kew, U. S. Nat., N. Y. Bot. Gard., Mo. Bot. Gard., Stanford, and other herbaria.

Other collections. In granitics just above highest Pleistocene lateral moraine on western slope of Mount Morgan, 11,500 feet, Rock Creek Lake Basin, Sierra Nevada, northwestern Inyo County, California, August 6, 1937, *C. W. Sharsmith 2999* (Herb. Univ. Calif., duplicates in same herbaria as isotypes); Inconsolable Range (head of South Fork of Bishop Creek, Inyo County), California, July 24, 1929, *Peirson 8549* (Peirson Herb.; depauperate form with immature, flat silicles).

Draba cruciata Pays. Am. Journ. Bot. 4: 265. 1917. *D. nivalis* Liljb. var. *californica* Jepson, Man. Fl. Pl. Calif. 444. 1925.

The type locality of *Draba cruciata* Pays. is "vicinity of Mineral King, Tulare County, California" (*Hall and Babcock 5361*). The type locality of *D. nivalis* Liljb. var. *californica* Jepson is likewise Mineral King (July 22, 1892, *T. S. Brandegee*). Examination of an isotype of *D. cruciata* and an isotype (or perhaps the type, although undesignated) of *D. nivalis* var. *californica,* both deposited in the University of California Herbarium, show the two specimens to be conspecific. The Brandegee specimen is slightly more mature, but the two are otherwise identical. The following specimen of *D. cruciata* (determination communicated by Dr. C. Leo Hitchcock) extends the known range of this apparently rare species northward: Dick's Peak, Tahoe, Eldorado County, 10,000 feet, *F. J. Smiley 432* (Gray Herb.).

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[1] Ridgway, R. Color Standards and Color Nomenclature. Washington, D. C. 1912.

Draba nivalis Liljb. is a holarctic species reported for Utah (Rydberg, Fl. Rocky Mts. and Adj. Plains, 354. 1922) and Colorado (Payson, *op. cit.*, 262), although the Colorado plants according to Payson "are not typical." In *D. nivalis* the petals are white and the fruiting styles 0.1–0.4 mm. long, whereas *D. cruciata* has yellow petals and fruiting styles up to 1 mm. long.

DRABA CRUCIATA Pays. var. **integrifolia** C. L. Hitchcock & C. W. Sharsmith var. nov. Folia quam in specie tenuiora integra, trichomatibus sparsioribus longioribus; siliculae contortae reticulatae muriculataeve; styli 1.0–2.0 mm. longi.

Leaves thinner than in the species, flaccid, sparsely pubescent on both surfaces with few-branched cruciform or simple trichomes 0.4–1.5 mm. long, trichomes longest on the basal margins; silicles contorted, predominantly lanceolate, sometimes attenuate, glabrous and smooth to reticulate-veined or muriculate or warty-roughened especially on or near the margins, occasionally minutely hispidulous with usually simple, bristle-like trichomes; styles 1–2 mm. long.

Type. Abundant in rock crevices in sheltered granite sand pockets above Mirror Lake, 11,000 feet, canyon of Lone Pine Creek, east of Mount Muir, Mount Whitney region, Sierra Nevada, Inyo County, California, August 21, 1937, *C. W. Sharsmith 3353* (Herb. Univ. Calif. no. 624297; isotypes at Gray, Kew, U. S. Nat., N. Y. Bot. Gard., Mo. Bot. Gard., Stanford and other herbaria).

Other collections. In sheltered places on buttress in cirque east of Mount Muir, head of canyon of Lone Pine Creek, 12,400 feet, Sierra Nevada, Inyo County, California, *C. W. Sharsmith 3338* (Herb. Univ. Calif., Gray, Kew, U. S. Nat., Mo. Bot. Gard., Stanford, Univ. Wash.); slopes of University Peak, Fresno County, 13,000 feet, *R. S. Ferris & R. Bacigalupi 3823* (Stanford).

The affinities of *Draba cruciata* have not been clear in the past. Payson (*op. cit.*, 265) states that "the relationship of this plant is not at all evident . . . Hall suggests it is near *D. Lemmonii.*" *Draba cruciata* var. *integrifolia*, however, offers definite evidence of a close affinity between *D. cruciata* and *D. sierrae* in the shape of the pods, the usually oblique position of the style, and the nature of the trichomes.

State College of Washington, Pullman,
May 8, 1939.

NEW AND OTHERWISE NOTEWORTHY PLANTS OF THE SOUTHWEST

Cornelius H. Muller

The Division of Plant Exploration and Introduction of the Bureau of Plant Industry for two seasons has been collecting plants, used by the Indians of Nevada, as a part of an undertaking to determine possible new agricultural crops. The collections made by the field staff of this Indian Plant Project contain many very interesting species. Outstanding among them is a new species of *Alnus* which differs so markedly from all previously known species of that genus, though still obviously congeneric with them, that it must be regarded as representing a new section of the genus.

Alnus Gaertn., sect. **Pycnantha** C. H. Mull. sect. nov. Amentae masculae et femineae saepe ex eadem gemma enatae; amentae masculae perpetuo densae, axe rigido haud pendulo, bracteis cum floribus deciduis.

Shrubs or small trees with the characters of the genus except that the staminate and pistillate catkins frequently come from the same bud, bracts of staminate catkins congested, rachis stiff, never pendulous, bracts deciduous with the flowers.

The type of this section is the following new species. The section is probably most closely related to the section *Alnobetula* W. D. Koch (Winkler, H.; Engler, Pflanzenreich 19. IV. 61: 102. 1904) from which it is readily distinguished by its stiff staminate catkins and the tendency of both male and female racemes to arise from a single bud. The facts that the latter character is not totally constant, that a similar tendency may occasionally be seen in species of other sections of the genus, and that no profound floral differences could be recognized indicate that this plant cannot be held generically distinct from *Alnus*. The nature of the inflorescence is the basis upon which the genus is divided into sections by Winkler (l.c.).

The author wishes to acknowledge his indebtedness to Mr. B. Y. Morrison for the drawings of *Alnus*.

Alnus densiflora sp. nov. Frutex; ramuli puberulentes annotini glabrati; gemmae falcatae, stipitatae 7 mm. longae; folia ovata vel elliptica, obtusa vel rare acuta, cordata vel rare cu-

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Explanation of the Figures. Plate 12.

Plate 12. *Alnus densiflora* C. H. Mull. Fig. A. Habit sketch of a branch (from the type specimen), ×1: *1*, young staminate aments; *2*, young pistillate aments; *3*, mature staminate aments; *4*, mature pistillate aments; *5*, bud. Fig. B. Apical or outer view of a mature staminate bract, ×6. Fig. C. Adaxial view of a mature staminate bract, ×6. Fig. D. Abaxial view of a mature pistillate bract, ×6. Fig. E. Adaxial view of a mature pistillate bract, ×6. Fig. F. Surface view of a fruit, ×6.

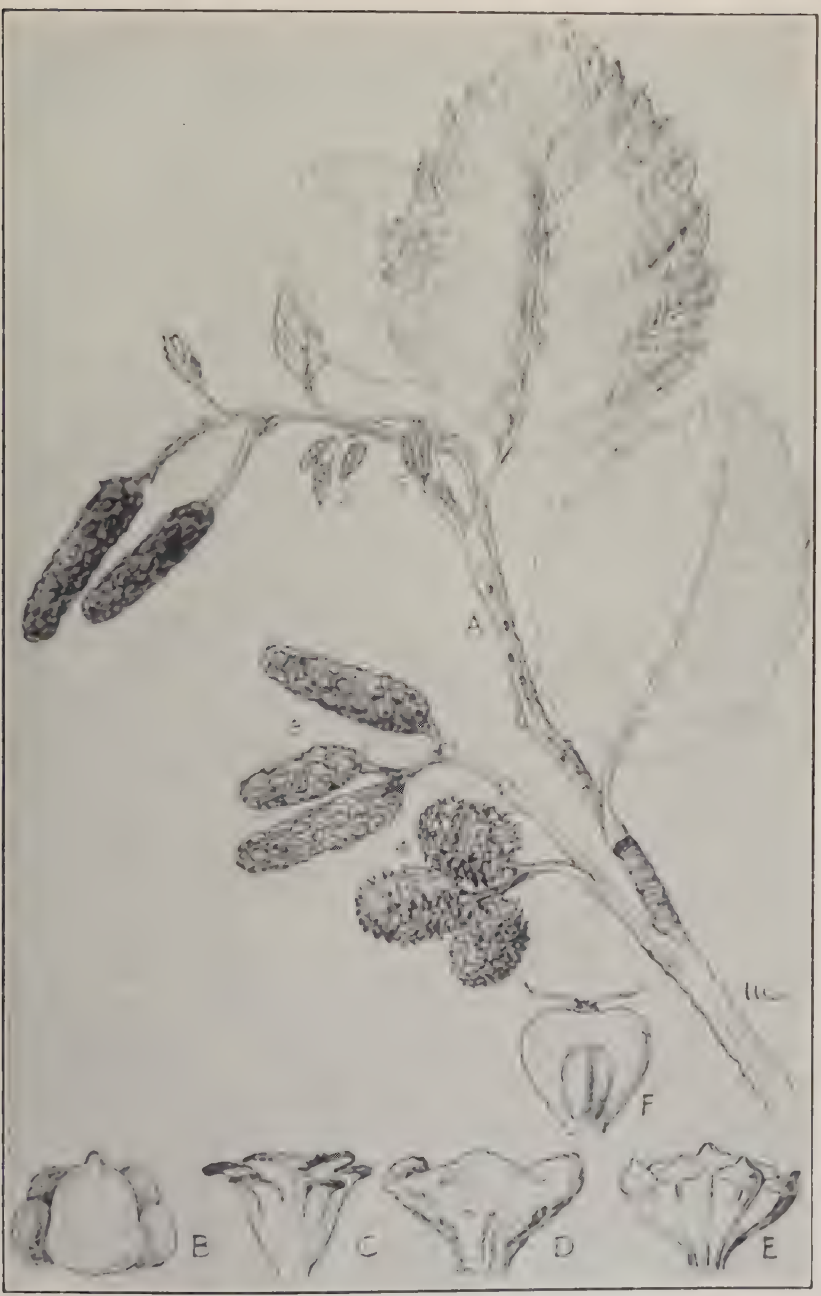

PLATE 12. ALNUS DENSIFLORA C. H. Mull.

neata, grosse duplicati-serrata, supra sparse pubescentia, subtus dense viscido-pubescentia vel fere glabrata; petioli 10–15 mm. longi, 1–1.5 mm. diametro, pubescentes; amentae masculae cylindricae, 25 mm. longae, 7 mm. diametro; perianthium 4-partitum, segmentis inaequalibus; amentae femineae ovoidae vel ellipticae, 10–15 mm. longae, 7–10 mm. diametro; nuces late cuneato-obovatae apice rotundatae basi truncatae alatae, ala acuta quam corpore angustiore.

Shrub 2–5 m. tall, trunk and branches short, bark brown with gray scales; twigs rather stout (2–3 mm. in diameter), shallowly round-fluted, at first reddish-brown and minutely densely puberulent with simple, stellate hairs, becoming glabrous the second year and covered with conspicuous gray wax but deep reddish-brown where abraded, lenticels few, large, prominent; buds falcate, stipitate, about 7 mm. long, densely puberulent like the twigs; leaves ovate to elliptic, apices rounded to obscurely acute, bases rounded, cordate or rarely cuneate, margins coarsely double-serrate save at the entire base, teeth rounded or finally minutely acuminate, upper surface dull green, minutely sparse-pubescent, lower surface densely viscid-ferruginous pubescent especially along midrib and principal veins or nearly glabrate save in protected places, the apparently denuded lower surface microscopically sericeous; lateral veins 9 or 10 on each side of the midrib, strictly parallel to one another, invariably passing into the major teeth (or lobes); petioles about 10–15 mm. long, 1.5 mm. in diameter, somewhat persistently pubescent; inflorescense of male and female catkins mixed in a simple panicle or borne in separate but closely proximal racemes, appearing terminally in summer and reaching anthesis the following summer in a lateral position on the stem and maturing in early autumn; racemes (including catkins) 3–6 or 7 cm. long, bearing 2–5 catkins on naked branches 1–6 mm. long articulated upon the naked peduncle, male catkins reaching almost full size the first summer, female catkins remaining minute and acute until the following spring; male catkins short and thick at maturity (about 25 mm. long, 7 mm. in diameter), the rachis inflexible, not elongating, the spike remaining dense through anthesis, bracts green turning brown as they dry at maturity, deciduous from the persistent brown rachis with the three staminate flowers still attached, bracts 5-parted at apical end, the shield-like middle lobe abaxial, flattened, the four apices of the adaxial lobes projecting from behind it; male flowers 4-merous, perianth parts fused only at base, adbracteal lobes longer than adracheal ones, brown like the bracts; female catkins short, ovoid or elliptic, about 10–15 mm. long, 7–10 mm. in diameter, bracts rather deeply 5-lobed, as in the staminate bracts the abaxial is in the middle and somewhat dominant over the other four which occur in one row and are essentially alike; nuts broadly cuneate-obovate, apex rounded, base truncate, margins acutely winged on each side with pithy inflated wings about two-thirds the width of the seed, the whole about 3 mm. long, 2 mm. wide, styles persistent, about 0.5–0.75 mm. long.

NEVADA. Storey County: southwest of Virginia City on the Jumbo Canyon Road, September 3, 1937, *R. A. Allen 514* (type, Herbarium of the National Arboretum 39964). "Shrub, 6–16 ft., brown bark with gray scales, short trunk and branching. Uncommon." The specific name *densiflora* was chosen to call attention to the compact nature of the staminate catkins.

A specimen of *Lycium* collected ten miles northeast of Schurz, between Rawhide and Schurz, Mineral County, Nevada, May 20, 1937, *E. V. A. Murphey 24* (in Herbarium of the National Arboretum), has been identified as *L. Shockleyi* Gray (Proc. Amer. Acad. 22: 311. 1887). Schurz and Rawhide lie in the north of Mineral County, while the type locality of *L. Shockleyi* is Candelaria in the south of the same county.

Hitchcock, in his monograph on American species of *Lycium* (Ann. Mo. Bot. Gard. 19: 179–374. 1932), reduces *L. Shockleyi* to synonymy under *L. Cooperi* Gray, pointing out that the calyx character of *L. Shockleyi* which is used to separate that species from *L. Cooperi* is not constant. He does not mention the sessile flowers solitary in the leaf fascicles, the very short free portions of the filaments, and the fruit included in the calyx, all pointed out in Gray's original description of *L. Shockleyi.* The ovules are always two in each cavity of the ovary, a fact which was not mentioned by Gray or Hitchcock. None of these characters is to be found in *L. Cooperi.* In Hitchcock's key *L. Shockleyi* would lead one to *L. Cooperi* or, if the calyx lobes should be a bit shorter than usual, to *L. verrucosum* Eastw. The coincidence of filaments adnate nearly their whole length in both *L. Shockleyi* and *L. verrucosum* is of no phylogenetic significance, as is evidenced by the total dissimilarity of vegetative and other flowering characters in the two species. *Lycium Shockleyi* does not satisfactorily negotiate the choice between the secondary divisions of Hitchcock's key, "Calyx lobes 2/3 as long . . . as the tubular portion, etc." and "Calyx lobes less than 2/3 as long as tube, etc." It must be regarded as fitting into the first category.

There follows an amplified description of *Lycium Shockleyi* based upon the Murphey specimen.

LYCIUM SHOCKLEYI Gray in Proc. Amer. Acad. 22: 311. 1887. *L. Cooperi* Hitchcock in Ann. Mo. Bot. Gard. 19: 305. 1932, *pro parte,* not Gray.

Low shrubs with somewhat strict stems 0.4–0.6 m. tall consisting of 1–5 internodes, arising at intervals from a rhizome, rather densely alternately branched above, bearing numerous slender, sharp, leafy spines 10–40 (usually about 20) mm. long, bark shredding, very light tan with very white outer layer, in age becoming flecked with minute black spots (apparently the growth of some micro-organism on the very surface); leaves in alternate fascicles of 4–10 (usually 6), oblanceolate or spatulate, 6–13 mm. long, 2–3 mm. broad, apex broadly rounded, base gradually narrowed to form a slender petiole (indistinguishable from blade), thick, succulent but essentially flat, the midrib occasionally prominent, both surfaces very sparingly stipitate-glandular (hairs of the type of *L. Parishii* or *L. exsertum,* the difference not distinguishable in dried material); flowers solitary in axils of principal leaves, occupying a central position in the axillary fascicle, sometimes apparently two, then occupying separate leaf fascicles at the same node, the flowering fascicles always on old wood, at either spine-bearing or naked nodes; pedicels very short, rarely over 0.5 mm. long; calyx oblong, glabrate, tube about 4 mm. long, 2–2.5 mm. wide at anthesis, its base broadly rounded or truncate, lobes 4, about 2 mm. long, slightly unequal, oblong, obtuse or rounded at apex, the whole strongly accrescent in fruit; corolla (color?), persistent after anthesis, 10 to occasionally 13 mm. long, narrowly infundibuliform, lobes 4, rarely 5, about 2 mm. long, broadly ovate, obtuse, glabrous, each lobe strongly veined with several branching veins issuing pinnately from the midrib, which arises prominently and practically unbranched from base of corolla, whole corolla glabrous without; stamens as many as corolla lobes, alternate with them, filaments adnate to corolla tube quite to bases of corolla lobes, free for less than 0.5 mm. of their length, lower one-third of adnate filaments and inner surface of the corolla tube immediately adjacent densely long-tomentose, anthers equally disposed just within the corolla throat, apparently sessile, about 2 mm. long; ovary 2- or rarely 3-carpellate, evidently divided into a broad, fleshy, bright red base and straw-colored, rounded upper half, style about 5 mm. long, never reaching much beyond halfway to corolla throat; ovules 2 in each cell; calyx completely enclosing fruit, strongly accrescent except for fleshy red base 1 mm. deep; berry hard, about 5 mm. long, 4.5 mm. in diameter, one or both sides with an irregular suture or fold; seeds lenticular to arcuate-oblong, about 3 mm. long, 1.5 mm. wide, two in each cell or rarely reduced to one by abortion, seedcoat thick, reticulate.

Lycium Shockleyi seems to have a very local distribution, there being apparently no authenticated records other than the type collection and the one here described, both from Mineral County. No doubt critical examination of material from other Nevada counties and from adjacent California would reveal a much wider range.

A variant of *Quercus dumosa* Nutt. of outstanding character was collected in Santa Barbara County, California, by Dr. Katherine Kinsel. All attempts to identify this plant as a hybrid failed utterly in the assigning of a second parent, and the relatively prolific fruiting of the specimens further discredited a hybrid origin. In appreciation of Miss Kinsel's excellent collections of California oaks, the author takes pleasure in naming this new variety in her honor.

Quercus dumosa Nutt. var. **Kinselae** var. nov. Frutex; folia oblonga vel obovata, profunde incisa, lobis utrinque 3–4, dentatis vel integris, supra nitida glabrata, subtus sparse sericeo-pilosa vel tomentosa; glans oblongo-conica, 3 cm. longa, 1–1.5 cm. diametro, basi solum inclusa.

Shrub about 3 m. tall, densely branched; twigs of the year 1–2 mm. in diameter (vigorous shoots 3–4 mm. in diameter and as much as 3 dm. long), at first sparingly or densely soft-stellate, soon glabrate or persistently scurfy; buds acute-ovoid, 2.5–3.5 mm. long, 1.5–2 mm. in diameter, brown, puberulent, stipules awl-like, soon deciduous; leaves rather thin, larger shade leaves very thin and papery, 2–4 (or sometimes 7) cm. long, 1.5–2.5 (or sometimes 4.5) cm. broad, oblong to obovate in outline, rather unequally subcordate, rounded, or cuneate at base, incised halfway to midrib with narrow, rounded sinuses forming 3 or 4 lobes on each side, the lobes pungently 2- or 3- (or several-) toothed near their apices, subclavate or sometimes entire and acute, upper surface dark green, glabrate, shining, with sparse silky pubescence of stellate and simple hairs about midrib basally, lower surface pale, softly puberulent or sparsely pilose especially on the veins and midrib; veins as many as the lobes, branching, passing into the pungent mucronations of the teeth; petiole 2–4 (usually 3) mm. long, densely tomentose with soft-stellate and simple hairs; fruit annual; cups sessile, paired or glomerate, hemispheric, 12–15 mm. in diameter, scales thickened and somewhat warty as in the species; acorns oblong-conic, about 3 cm. long, 1–1.5 cm. in diameter, covered at base only.

California. Santa Barbara County: Rattlesnake Canyon Road on Skofield Ranch near Santa Barbara, altitude 1,000 feet, October 30, 1938, *K. Kinsel 50* (type, Herbarium of the National Arboretum 43970); collected from the same tree, sterile with much larger leaves of thinner texture, November 12, 1938, *K. Kinsel 51* (Herbarium of the National Arboretum).

Quercus dumosa var. *Kinselae* differs from typical *Q. dumosa* as well as its several varieties in the deeply incised leaves with narrow sinuses, several-toothed lobes, and thin blades. From *Q. lobata* Née it is readily distinguished by its shrubby habit and small leaves with mucronately pungent lobes.

The acorns of this variety markedly resemble those of *Quercus lobata,* and the lobing and pubescence of the leaves also suggests that species. However, if one were to regard this plant as a hybrid between *Q. dumosa* and *Q. lobata,* it would be necessary to account for the fact that the offspring resembles one parent

(*Q. dumosa*) much more closely than the other in habit, characters of the twigs, mucronate lobes and teeth of leaves. Furthermore, the characters most suggestive of *Q. lobata* parentage (i.e., the fruit character and the nature of the leaf pubescence) are both common on other varieties of *Q. dumosa* (e.g., the variety *Alvordiana* Jepson) which could not possibly be related to *Q. lobata.* The strongest argument against the assumption of *Q. lobata* parentage is the existence of several intermediates between the variety here described and typical *Q. dumosa,* while an examination of some fifteen hundred sheets of southern California oaks has not revealed a specimen suggestive of an intermediate between this variety and *Q. lobata.*

Though the variety *Kinselae* is probably of very local distribution in its typical extreme form, forms of *Q. dumosa* strongly suggestive of this variety have been seen from Los Angeles and San Bernardino counties. Among these are the following specimens: Brea Canyon, Los Angeles County, February 26, 1921, *E. A. Spalding* without number (Baker Herbarium, Pomona College 18616); Santa Anita Canyon, San Gabriel Mountains, Los Angeles County, July 4, 1933, *J. A. Ewan 7852.* In both these the leaves are much more coriaceous than in the variety *Kinselae,* and the lobing of the leaves hardly amounts to more than coarse serration. The specimen collected by Ewan is rather densely tawny-tomentose on the leaves beneath.

Division of Plant Exploration and Introduction,
Bureau of Plant Industry, U. S. Department of Agriculture,
Washington, D. C., February, 1939.

A NEW SPECIES OF ERIOGONUM FROM BAJA CALIFORNIA

IRA L. WIGGINS

Eriogonum Vollmeri sp. nov. Herba perennis erecta 1.5–2.5 m. alta; caulibus gracilibus ad basim glabris glaucis, internodiis clavatis paululum inflatis 2–3.5 dm. longis; laminis foliorum ellipticis 2.5–4 cm. longis apicem acutis vel obtusis subter lanatis dense supra glabris tarde; petiolis gracilibus 5–10 cm. longis; stipulis anularibus 2–3-dentatis 2–4 mm. altis; involucris solitariis sessilibus 5–6 mm. longis cylindro-campanulatis leviter 5-dentatis dense lanatis; floribus luteolis 2.9–3.2 mm. altis, segminibus exterioribus oblongo-spathulatis segminibus interioribus linearo-spathulatis; staminibus 9 inclusis basim pubescentibus; fructu triquetro gracili et apicem acuto.

Erect herbaceous perennial 1.5–2.5 m. high, with 2–12 slender, virgate stems from a sturdy woody rootstock; stems glabrous and slightly glaucous near the base, gradually becoming floccose-lanate toward the summit, the lower internodes narrowly clavate, 2.0–3.5 dm. long, 4–6 mm. in diameter at the base, about twice as

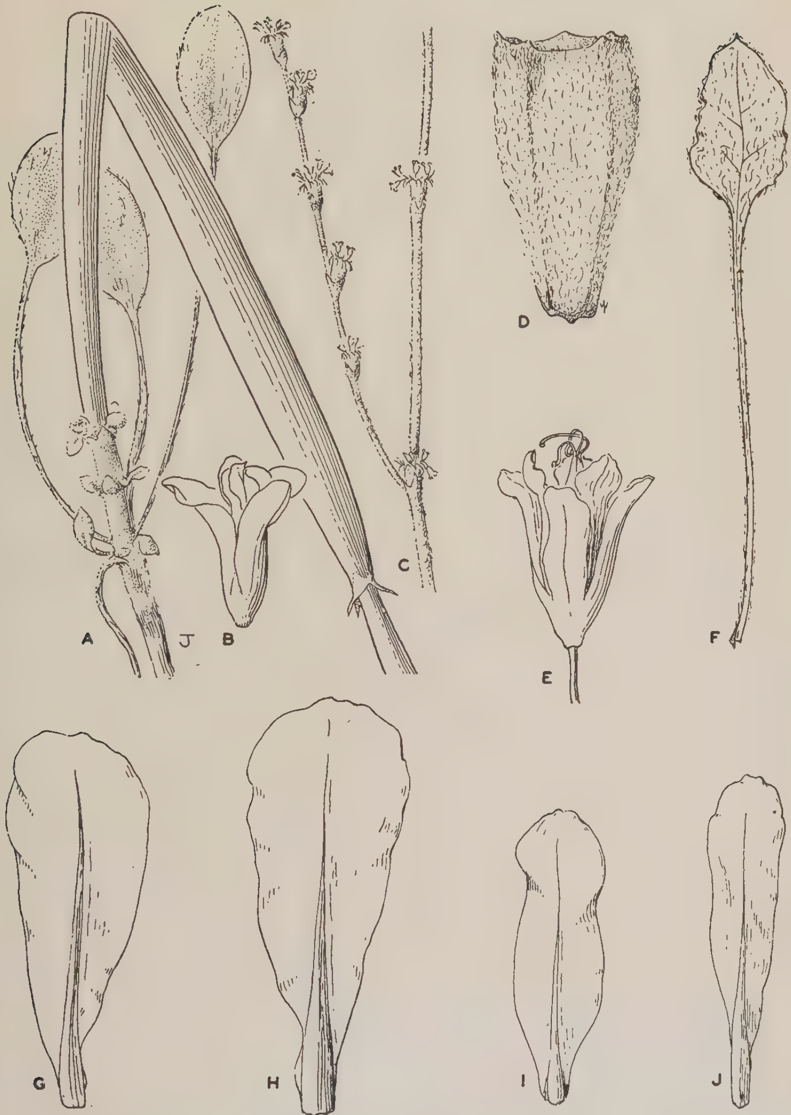

Plate 13. Eriogonum Vollmeri Wiggins: *A,* base of plant, × ⅔; *B,* flower, × 6.6; *C,* branch of inflorescence, × ⅔; *D,* involucre, × 6.6; *E,* older and larger flower, × 6.6; *F,* basal leaf, × ⅔; *G,* outer perianth segment of *Eriogonum elongatum* Benth., × 12.6; *H,* inner perianth segment of *E. elongatum,* × 12.6; *I,* outer perianth segment of *E. Vollmeri,* × 12.6; *J,* inner perianth segment of *E. Vollmeri,* × 12.6.

thick 5–8 cm. below the summit of the internode, gradually shorter and narrower, with less swollen apex toward the inflorescence, all except the uppermost fistulose, branching sparingly in the upper one-fourth of the plant; leaves basal, the blades elliptic, 2.5–4 cm. long, 1.5–2.5 cm. wide, on slender petioles 5–10 cm. long, with elliptic, fasciculate leaves 5–10 mm. long in the axils, white-tomentose beneath, tardily semiglabrate on the upper surface; sheathing stipules at nodes above the base dark red-brown, containing dense mats of white wool within their cusps, 2–3-toothed, the teeth narrowly triangular, 2–4 mm. high; inflorescence of several slender, erect, virgate branches 1–4 dm. long; involucres solitary, sessile, cylindro-campanulate, 2–3 mm. in diameter, 5–6 mm. long, obscurely 5-angled, faintly 5-toothed to subtruncate at the apex, densely lanate, the wool rusty-red along the angles and near the apex; flowers 15–30 in each involucre, pale yellow or sometimes tinged with pink, 2.8–3.2 mm. high, glabrous, the outer perianth segments oblong-spatulate, slightly spreading at the apex, the inner linear-spatulate, erect, slightly longer than the outer segments, both obtuse to faintly emarginate at the apex; stamens 9, about equaling the perianth segments, but the filaments sharply inflexed at the tips, thus included; anthers white or faintly yellow; achene triquetrous, the angles obtuse, the slender body gradually tapering into the narrow beak which is about one third as long as the body.

Type. Rocky soil along an arroyo about one mile north of La Palisada, northern end of the Sierra San Pedro Martir, Baja California, Mexico, altitude 1230 meters, *Ira L. Wiggins 9123*, Sept. 25, 1938 (Dudley Herbarium of Stanford University, no. 263,148).

Eriogonum Vollmeri seems to be related most closely to *E. elongatum* Benth., from which it differs in having more strict, less branched, taller stems which are glabrous or essentially so at the base; more conspicuously inflated internodes; longer petioles; smaller yellow flowers with narrower perianth lobes than those of *E. elongatum* (pl. 13, G–J); white to light yellow instead of pink or red anthers; and filaments sparingly villous at the base.

This species is named in honor of Dr. Albert M. Vollmer, of San Francisco, whose generosity made possible the trip into the Sierra San Pedro Martir, and who first called to my attention this graceful *Eriogonum*.

Flowering and fruiting plants were seen in abundance along the arroyos and on the lower slopes of the adjacent hills from the vicinity of La Palisada almost to Valle de la Trínidad. Salve Meling, our guide, thought that it also grows along the eastern escarpment of the Sierra San Pedro Martir southward for a distance of seventy-five or a hundred miles.

Stanford University,
November 10, 1939.

A NEW SPECIES OF VISCAINOA FROM BAJA CALIFORNIA

Howard Scott Gentry

In 1889 Townshend Stith Brandegee rode from La Purisima to San Ignacio along the Pacific side of Baja California. For a half century no other botanist so much as collected a plant through that long stretch of the peninsula. Physiographically it is a very striking region with a variable series of Pliocene and Pleistocene marine sediments eroded into colorful escarpments and masses which, reared out of the sea, are frowned upon by the massive volcanic cerros overtowering on the eastward. A few years ago one of the Baja California governors started an automobile road from La Purisima to San Ignacio, but abandoned the route almost as soon as the right-of-way was laid out. With a week's supply of water and provisions, a shovel, a machete, and a good moso, the road can still be driven from Purisima north as far as a broad sandy arroyo about eight miles north of San Juanico.

Though we are here primarily concerned with the arroyo locality, San Juanico is a type locality for several of Brandegee's collections and has an exceeding charm and importance all its own. Quite the place for the proverbial survivor of a shipwreck to find a temporary haven, there is a small group of date palms nurtured by a spring of clear, slightly saline water. A broad beach is less than a quarter of a mile away; upon its sands the numerous tracks of coyotes give evidence of a rich sea life along the shallow margins of the bay. An interesting horizon of calcareous badlands enfolds the place in an earthy pageantry of greens, yellows, reds, and grays. San Juanico is uninhabited and except for an occasional vaquero and a few stray cattle, only wild animals come there to drink. Vegetation is sparse.

Passing on eight miles northward, I was fortunate in encountering the 3- to 5-foliate *Viscainoa,* which Brandegee discovered in the region and of which he wrote under the name *Viscainoa geniculata* (Kell.) Greene (Proc. Cal. Acad. Sci., Ser. 2, 2: 137. 1889). Brandegee's collection was made at San Raimundo which, judging from his map, must be very close to my locality of collection and very possibly may be the rancho now called Cadajé. Since the plant appears so distinct from all other known variants of *Viscainoa geniculata,* the following segregation is offered.

Viscainoa pinnata sp. nov. Suffrutex 2–3 m. alta, ramis minute striatis, irregulariter pubescentibus; foliis 3- ad 5-foliatis, rarissime simplicis, petiolatis, plus minusve pubescentibus vel in senectute glabris, ovato-lanceolatis, ad apicem acutis, ad basim cuneatis; floribus terminalibus, 1–5 in axillis, petalibus fulvis, filamentis 4–5 mm. longis, ad basim latis; fructus vix pubescentibus.

Shrub 2--3 m. high, 3–5 m. broad, polypodial or branching from near base; young branches green, slender, pliant, 2–10 dm. long, straight, descending, horizontal, or ascending from old grayish-brown branches; internodes 1–6 cm. long, sparsely long-pubescent, striate; nodes with dense white tomentum in axils persisting after defoliation; stipules deciduous, 4–6 mm. long, subulate, long-pubescent when young, in age subglabrous; leaves green, mostly 3–5 cm. long, 3- to 5-foliate, rarely simple, rarely with one lateral leaflet lacking; petioles mostly 10–15 mm. long, sparsely pubescent, rachis sparsely pubescent; leaflets ovate-lanceolate, acuminate-mucronate at tips, cuneate at bases, slightly pubescent to glabrous in age, finely pinnately veined from a strong mid-vein; ultimate leaflet largest, mostly 3–5 cm. long, 1.5–2 cm. wide; lateral leaflets opposite or subopposite, sessile, or with petiolules 1 mm. long, adjacent to ultimate leaflet or discrete (interval 2–5 mm.), mostly 2–3 cm. long, 8–12 mm. wide; flowers mostly terminal on branches, 1–5 in axils; pedicels pubescent, 1 cm. long, accrescent in fruit to 1.5 cm. long; sepals 4–5, caducous, densely tomentulose, oblong-orbicular (one or two deeply cupped), 8–10 mm. long, 4–7 mm. wide; petals 4–5, yellow, suborbicular, about 10 mm. long, 8–9 mm. wide; filaments 4–5 mm. long, broadened at base; anthers oblong, 2 mm. long; ovary short-stipitate, 3- to 5-celled, densely white tomentulose; pistil 3- to 4-lobed, lobes margined with fine granular tomentum; fruiting pedicels 1.5 cm. long; fruit obovoid, green, 3- to 5-celled, 2–3 cm. long, 1.2–1.5 cm. wide, slightly reticulate, relatively sparsely fine-pubescent, variably beaked.

Type. On agglomerate cliff about eight miles north of San Juanico, Baja California, where an abandoned road crosses a wide sandy arroyo, March 8, 1939, *Howard Scott Gentry 4311* (Shreve Hebarium, Carnegie Desert Laboratory, Tucson, Arizona). Isotypes are deposited in the following herbaria: Dudley Herbarium, Stanford University; University of California; Missouri Botanical Garden; Arnold Arboretum, Harvard University; Royal Botanic Gardens, Kew; Instituto de Biologia, Universidad de Mexico, D. F.; Gentry Herbarium, Carnegie Desert Laboratory, Tucson, Arizona.

This first specific addition to the genus *Viscainoa* may be distinguished readily as follows:

Leaves usually entire; petioles short, 1–10 mm. long; filaments not broadened at base, often brownish glandular for some distance above the base; plants generally cinereous, flowers pale yellow .... *V. geniculata*
Leaves usually 3- to 5-foliate; petioles longer, 10–15 mm. long; filaments broadened at base, not brownish glandular; plants green; flowers bright yellow. *V. pinnata*

Desert Laboratory of the Carnegie Institution,
Tucson, Arizona,
June, 1939.

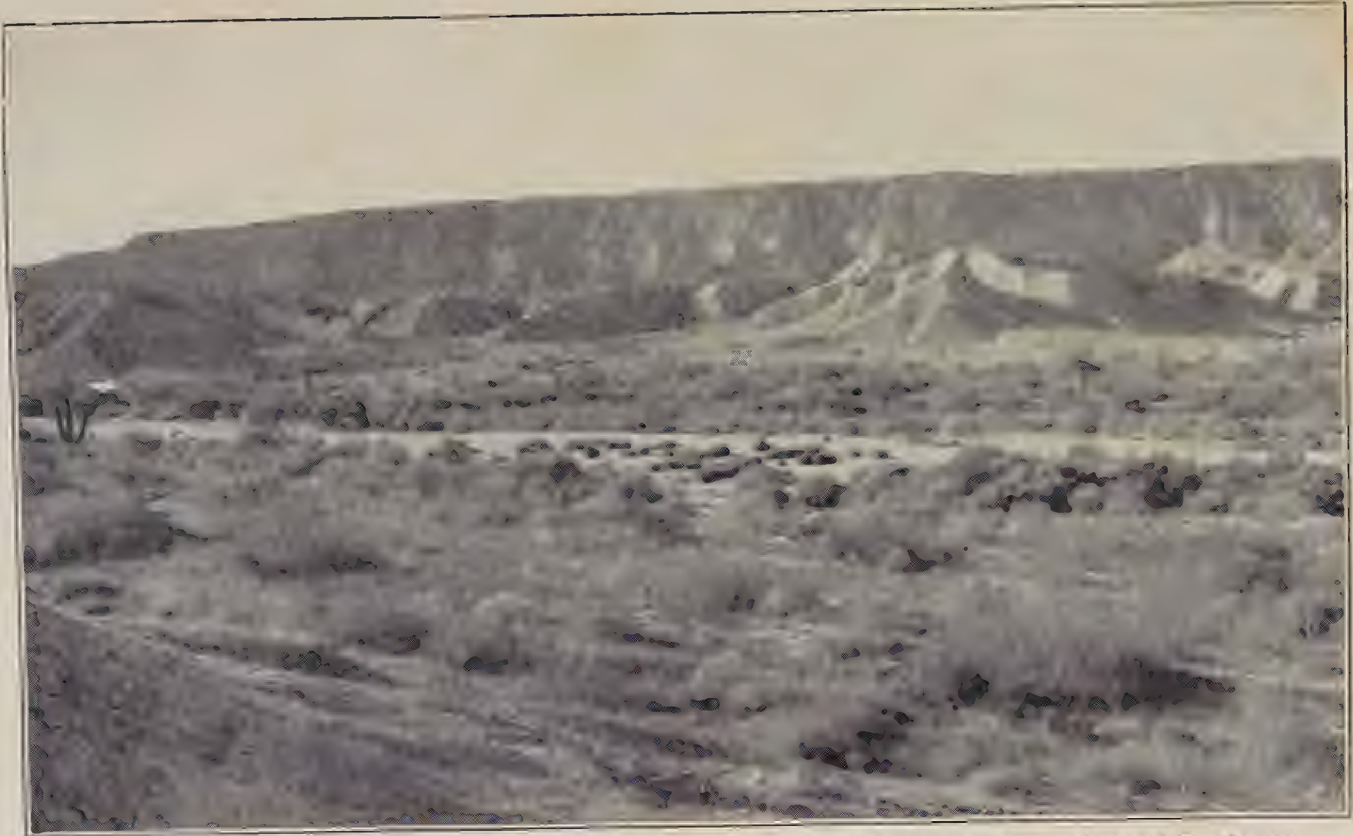

Plate 14. View along the Pacific side of the peninsula of Lower California about eight miles southeast of San Juanico.

FRED M. REED

Fred M. Reed was born at Mansfield, Ohio, May 29, 1867, and died at Riverside, California, on June 15, 1939. He had lived at Riverside from 1890 until his death. By occupation Mr. Reed was an orange grower, but by avocation he was a botanist of uncommon ability. He is best known for his studies on the flora of Riverside and vicinity, but he extended his work into the adjacent Colorado and Mojave deserts. He was an industrious collector and exchanged material with S. B. Parish, Marcus E. Jones, and Dr. Philip A. Munz. He was very generous in donating specimens to the University of California herbarium.

Fred M. Reed
Photograph by courtesy of the "California Citrograph."

During the course of years, Mr. Reed had accumulated a valuable herbarium of his own and constructed a building on his ranch to house his collection and to afford him a place to work on his plants as he had opportunity.

In 1903 Mr. Reed was secretary of the Riverside Botanical Club. From a communication sent to one of the periodicals, we learn that this Club met monthly on the Friday evening nearest the full moon for the benefit of members from out of town. Later, when means of travel had improved, they did not set the dates of the meetings by the lunar phases.

Mr. Reed was frequently consulted by people in southern California who wished determinations of new or doubtful plants. Although his schooling in youth was very scanty, he acquired facility in the use of several modern languages and wrote uncommonly clear and beautiful English. He owned an orange grove and was a successful citrus grower. In addition to his active work in the management of the orange grove, he was president of the Monte Vista Citrus Association, which handled fruit for the growers in the cooperative California Citrus Growers' Association. He had a very fine taste in music and for many years sang in the choir of the First Congregational Church of Riverside. Mr. Reed was unmarried.

His ability as a botanist may be judged from the fact that when the late Professor Hugo de Vries, of Amsterdam, visited California a number of years ago, his first wish was to visit Riverside and meet Mr. Fred Reed, who was so well acquainted with the species of *Oenothera* which grew on the deserts of southern California.—H. S. Reed.

NOTES ON ORTHOCARPUS

David D. Keck

Orthocarpus faucibarbatus Gray, Pacif. Rail. Rep. 4: 121, 1856.

When I published a revision of *Orthocarpus* in 1927 (Proc. Calif. Acad. Sci. 4th ser. 16: 517–571), I had had almost no field experience with *O. faucibarbatus.* I had found from herbarium material that the corolla was sometimes pale yellow, sometimes white, but suspected that the variation probably occurred at random. Field studies since have shown that corolla color is a clear mark of geographic subspecies. The yellow-flowered form appears to be confined to the valleys away from the immediate coast, and is found northward from San Francisco Bay to Mendocino County. The color of the flower cannot be determined in the type specimen, but it came from Corte Madera, Marin County, where only the yellow-flowered form is now found. That leaves the white-flowered form, which is confined to the coastal strip from southern Oregon to Monterey County, California, in need of a name.

Lower lip of corolla yellow; valleys of the North Coast Ranges, California	1a. *O. faucibarbatus* subsp. *typicus*
Lower lip of corolla pure white, together with the tube often turning pinkish in age; immediate coast, southern Coos County, Oregon, to northern Monterey County, California	1b. *O. faucibarbatus* subsp. *albidus*

1a. Orthocarpus faucibarbatus Gray subsp. **typicus** nom. nov.

O. faucibarbatus Gray, *loc. cit.*

O. erianthus var. *laevis* Gray, Syn. Fl. 2: 453. 1886.

1b. Orthocarpus faucibarbatus subsp. **albidus** subsp. nov. A subsp. *typico* differt corollae labio inferio albo dein roseo.

At the base of each free lobe of the lip of the corolla there is a greenish orange or greenish yellow spot.

Specimens from the following herbaria have been examined: Botanischer Garten und Botanisches Museum, Berlin-Dahlem, B; University of California, Berkeley, C; California Academy of Sciences, San Francisco, CAS; Carnegie Institution of Washington, Stanford University, CI; Universitetets Botaniske Museum, Copenhagen, Cop; Field Museum of Natural History, Chicago, F; Conservatoire et Jardin Botaniques de la Ville, Genève, G; Gray Herbarium, Harvard University, Cambridge, GH; Royal Botanic Gardens, Kew, K; Missouri Botanical Garden, St. Louis, M; University of Notre Dame, Notre Dame, ND; New York Botanical Garden, New York, NY; Academy of Natural Sciences, Philadelphia, Ph; Pomona College, Claremont, Po; Rocky Mountain Herbarium, University of Wyoming, Laramie, RM; Dudley Herbarium, Stanford University, SU; United States National Herbarium, Washington, US. In the following citations, herbaria in which previously cited (Keck, *op. cit.*) collections are located are not repeated.

OREGON. Coos County: between Bandon and Langlois, *Abrams & Benson 10635.* CALIFORNIA. Del Norte County: Gasquet, *Tracy 12276* (CI, the farthest inland station yet recorded); French Hill near Gasquet, *Gillespie 9692* (SU); Douglas Park, Smith River, *Thompson 12905* (CI); Crescent City, July 1, 1899, *Dudley* (SU); 4 miles south of Crescent City, *Keck & Clausen 3401* (C, CI, Po, SU). Humboldt County: Snow Camp, *Kildale 10564* (SU); Patricks Point, *Kildale 3590* (SU); Trinidad, *Tracy 3237*; Little River; Mad River, 1878, *Rattan* (SU); Arcata; Humboldt Bay, *Chandler 1101;* Gunther's Island, Humboldt Bay, *Kildale 9528* (SU); 4 miles south of Eureka, *Keck & Clausen 3380* (CI, SU). Mendocino County: Noyo, *Bolander 6537*; Albion, *McMurphy 305* (SU); Stewarts Point, *Abrams 7616* (SU). Sonoma County: Fort Ross, *Heller 6607*; 3 miles south of mouth of Russian River, *Keck & Clausen 3375* (SU, type; isotypes, C, CAS, CI, F, GH, M, NY, Ph, Po, RM, US). Marin County: near Lighthouse, Point Reyes, *Abrams 11615* (SU). San Francisco, *Jones 3267, Bolander 6301.* San Mateo County: Pebble Beach, Pescadero; Ano Nuevo Point, *Keck 5009* (B, CI, GH, ND); Arroyo de los Frijoles. Santa Cruz County: Swanton, May 12, 1912, *Rich* (SU); west of Watsonville, *Baker 1955.* Monterey County: between Salinas and San Juan Grade, *Abrams 6402* (SU); Castroville, *Elmer 4474, Heller 8491.*

This is the subspecies that was introduced toward the end of the last century on Vancouver Island near Victoria. In the spring of 1939 it was recollected at Ten Mile Point, Victoria, by J. W. Eastham (CI).

ORTHOCARPUS FLORIBUNDUS Benth. × O. PUSILLUS Benth. Two plants of this interesting and hitherto unreported hybrid were found growing with both parental species near the station of the Radio Corporation of America on the road to Point Reyes Lighthouse, Marin County, California, April 1 to 10, 1936, by Milo S. Baker (CI).

Carnegie Institution of Washington,
Division of Plant Biology,
Stanford University, California,
November 30, 1939.

NEW SUBSPECIES IN HAPLOPAPPUS

David D. Keck

Haplopappus racemosus (Nutt.) Torr. in Sitgreaves Rep. 162. 1854.

While determining a number of collections of the composite genus *Haplopappus,* section *Pyrrocoma,* my attention was drawn to a pair of undescribed subunits within *Haplopappus racemosus* (Nutt.)Torr. Dr. H. M. Hall[1] took a conservative view toward the species of this genus and brought together a variable assemblage of forms under *H. racemosus.* In going over the collections at the University of California, Stanford and Carnegie Institution, I find, as Hall did, that the series of forms which Hall maintained in *H. racemosus* does not present large gaps that might be used advantageously for dividing it up into several species. The gaps that are discernible may perhaps as well be considered as the marks of geographic subspecies as of species. Lacking all cytogenetic and other experimental data on the group, there seems to be no justifiable basis for following out my first inclination at least to segregate those plants of alkaline from those of non-alkaline soils into different species. So I am content to describe the present new units as subspecies of *H. racemosus,* although they represent very different portions of the series of variations and do not seem at all compatible in the same species unless the entire gamut of variation is viewed at one time.

Hall has recognized nine subspecies of *H. racemosus.* In the major division of his key to these subspecies, he has separated subspecies *typicus, congestus* and *duriusculus* from the remainder on the following characters: "Leaves not thick, the lateral veins visible (least so in *typicus,* known by its large heads). Plants of non-alkaline soil." The latter point does not hold for subsp. *duriusculus,* as one can determine from the labels on the specimens, and in his discussion of the ecology of the species Hall remarks, "With the exception of *typicus* and *congestus,* all of the subspecies of *Haplopappus racemosus* are indicators of an alkaline or saline soil."

Material of the first of the following entities was unknown to Hall, but of the second he had available a single sheet which he placed under subsp. *duriusculus.*

Haplopappus racemosus subsp. **pinetorum** subsp. nov. Caulibus erectis strictis tenuibus 2–5 dm. altis stramineis; foliis radicalibus lanceolatis acutis ad basim attenuatis integerrimis vel echinato-denticulatis 6–20 cm. longis, 5–16 mm. latis gracilibus utrinque pilosis haud glandulosis; inflorescentia plerusque racemosa interdum paniculata internodis longis; involucro hemisphaerico 10–13 mm. alto, 12–15 mm. lato, squamis imbricatis oblongo-lanceolatis acutis obtusisve mucronatis dense pilosis, marginibus anguste hyalinis; acheniis sericeis.

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[1] The Genus Haplopappus. Carnegie Inst. Wash. Publ. 389: 127–144. 1928.

This subspecies is known only from the type collection made in the Scott Mountains of southern Siskiyou County, California, on the ridge between Mill and Mule creeks, three miles south of Scott Mountain Lodge, at 1340 meters elevation, August 8, 1938, *Keck 4862* (SU, type; isotypes, C, CI, Po, US). The specimen was taken in non-alkaline soil among scattered chunks of lava under a forest cover of *Pinus ponderosa.*

The closest relative of subsp. *pinetorum,* probably both morphologically and geographically, is subsp. *congestus* (Greene) Hall. The latter is likewise a dweller in openings in coniferous woods, excepting that of subsp. *typica,* a habitat very different from those occupied by the other subspecies, which are found under varying degrees of alkalinity up to *Distichlis* covered salt flats. Subsp. *pinetorum* differs from subsp. *congestus* in the spiny-toothed leaves, the much more densely pilose herbage, the less anthocyanous, more slender, more strictly erect stems, and in the arrangement of the inflorescence, which instead of being typically glomerate-spicate as in subsp. *congestus,* is openly spicate or racemose, with rather long internodes, or, in robust specimens, even corymbosely paniculate. Whereas subsp. *congestus* is found in Jackson, Josephine and possibly Curry counties, southwestern Oregon, and Del Norte County, California, subsp. *pinetorum* is some seventy-five miles distant from the nearest known station of subsp. *congestus* in quite another mountain system.

The occasional occurrence of corymbosely paniculate inflorescences causes some speculation as to whether or not this subspecies should not be referred to *Haplopappus lanceolatus* (Hook.) Torr. & Gray, which is differentiated from *H. racemosus* principally on the basis of this character. Because *H. lanceolatus* is thought to be limited to alkaline soils and is not found west of the Great Basin, there seems to be no doubt that the present unit is more closely related to *H. racemosus,* which occurs nearer at hand with a subspecies of non-alkaline habitats. However, the occasional, previously recognized unreliability of the inflorescence character in separating these two large species from each other is made more apparent with the discovery of the present unit.

HAPLOPAPPUS RACEMOSUS subsp. **lucidus** subsp. nov. Caulibus erectis, strictis 2–4.5 dm. altis pallidis; foliis plus minusve vernicosis glaberrimis alternis (rare inferis oppositis) lanceolatis acutis integerrimis vel argute dentatis scabridulo-ciliolatis, radicalibus petiolatis 6–15 cm. longis, 7–23 mm. latis; inflorescentia glomerato-spicata vel racemosa; involucro campanulato 9–13 mm. alto, 9–20 mm. lato, squamis paucis subaequalibus laxe imbricatis lanceolatis attenuatis glaberrimis viscidissimis; acheniis sericiis.

In alkaline grassy flat, one mile west of Portola, Plumas County, California, at 1480 meters elevation, August 9, 1938, *Keck 4897* (SU, type; isotype, CI); also collected at Portola, in 1913, *Katherine Brandegee* (C).

The Brandegee specimen was cited by Hall (*op. cit.*) under *H. racemosus* subsp. *duriusculus* (Greene) Hall. He cited only two other collections under this subspecies, both from eastern Oregon. These differ from the Portola material in lacking the dense glandular exudate which makes the latter glisten, and in having broader, lance-oblong, sharply acute, more definitely seriated and imbricated and wider hyaline-margined involucral bracts. These characters, together with the appreciable geographic gap between Malheur County, Oregon, and Plumas County, California, set off obviously distinct subspecies. The relationship of subsp. *lucidus* with the other subspecies of the complex is less close.

Haplopappus eximius Hall, Univ. Calif. Publ. Bot. 6: 170. 1915.

This species may now well be broken up into two very distinct geographic subspecies following intensive botanical exploration of the crest and eastern flank of the Sierra Nevada in recent years by the men making the Vegetation Type Map Survey of the United States Forest Service, by Frank W. Peirson of Altadena, by the Carnegie Institution of Washington, and others. No colonies of this species have been found between Eldorado County and Inyo County as Hall expected there might be when he pointed out the significant morphological differences that separate the Inyo County material from that in the mountains about Lake Tahoe (Carnegie Inst. Wash. Publ. 389, p. 182, 1928). These differences may be brought out as follows:

Involucres 7.5–10 mm. high, 12–15 mm. wide (pressed), shorter than the disk-flowers, the outer bracts spatulate-oblong to oblong-obovate, rounded or obtuse, mucronate (the outermost bracts foliose); disk-corolla 6–7 mm. long, equalled by the pappus; lower cauline leaves 7–15 mm. wide. . . . . 1a. *H. eximius* subsp. *typicus*

Involucres 14–18 mm. high, 20–30 mm. wide (pressed), equaling the disk-flowers, the outer bracts lanceolate or lance-oblong, obtuse or acute, (the outermost bracts foliose); disk-corolla 9–10 mm. long, one fourth longer than the pappus; lower cauline leaves 10–25 mm. wide . . . . 1b. *H. eximius* subsp. *Peirsonii*

1a. Haplopappus eximius subsp. **typicus** nom. nov.

Haplopappus eximius Hall, *loc. cit.*

Tonestus eximius Nels. & Macbr. Bot. Gaz. 65: 70. 1918.

High mountains in the region of Lake Tahoe, from southern Washoe County, Nevada, to Eldorado County, California. Type locality: crevices of granitic rocks at an altitude of 2680 meters on a peak 1 kilometer south-southwest of Angora Peak, El Dorado County, California.

NEVADA. Washoe County: Broncho Creek, *Kennedy 1363* (RM). CALIFORNIA. Lake Tahoe, summer 1928, *Vortriede* (CAS). Eldorado County: peak south-southwest of Angora Peak, July 1910, *Geo. R. Hall* (C, type; isotypes, C, GH, US); Ralston Peak, July 30, 1910, *Geo. R. Hall* (B, C, CI, Cop, G, GH, K, Po, SU); *Geis 18* (C), *Smiley 417* (GH); Star Lake, July 24, 1918, *Evans* (C).

1b. HAPLOPAPPUS EXIMIUS subsp. **Peirsonii** subsp. nov. Maioribus; foliis inferioribus 10–25 mm. latis; involucro 14–18 mm. alto, 20–30 mm. lato, squamis exterioribus e lanceolatis usque ad oblongis acutis vel obtusis; disci corollis 9–10 mm. longis, quam pappi setis aliquanto longioribus.

This subspecies is known only from high elevations along the eastern flank of the Sierra Nevada in Inyo County, California. It is named in honor of Frank W. Peirson, of Altadena, California, who for many years has made invaluable collections from some of the least known portions of the Sierra Nevada.

Inyo County: Transverse Ridge, Upper Rock Creek Lake Basin, northwestern corner of Inyo County, 3380 meters (11,100 feet) altitude, Aug. 5, 1933, *Frank W. Peirson* (C, type; isotype, SU); Long Lake, Upper Rock Creek Lake Basin, 3260 meters, *Peirson 9077* (CAS, CI); North Fork Bishop Creek, 3050 meters, *Peirson 2517* (C); Taboose Pass, 3280 meters, Aug. 18, 1921, *Peirson* (C); Sawmill Pass, 2950 meters, *Peirson 1404* (C).

Carnegie Institution of Washington,
Division of Plant Biology,
Stanford University, California
November 30, 1939.

THE IDENTITY OF MADIA DISSITIFLORA (NUTT.) TORR. & GRAY

DAVID D. KECK

Madia gracilis (Smith) comb. nov.

Sclerocarpus gracilis Smith, in Rees' Cycl. 33: Sclerocarpus, sp. 2, 1819.

Madorella dissitiflora Nutt., Trans. Amer. Phil. Soc. ser. 2, 7: 387. 1841.

Madia dissitiflora Torr. & Gray, Fl. N. Amer. 2: 405, 1843.

Madia sativa var. *dissitiflora* Gray, Proc. Amer. Acad. 9: 189. 1874.

Madia sativa subsp. *dissitiflora* Keck, MADROÑO 3: 4. 1935.

Since the publication of *Madia sativa* subsp. *dissitiflora* in 1935, we have learned through additional garden experiments that the unit should stand as a distinct species.

Until the present time authors have questioningly placed *Sclerocarpus gracilis* Smith under the synonymy of *Madia exigua* (Smith) Gray, because the brief original description left doubt as to just what plant was meant, and the type has not previously been consulted by those working on *Madia*. While consulting the material of Madiinae deposited at the Royal Botanic Gardens, Kew, in 1936, Dr. Jens Clausen discovered an undoubted isotype of *Sclerocarpus gracilis*. It proved to be the slender form of the species which has passed for almost a century as *Madia dissitiflora*. With this information as a guide, I asked Dr. I. L. Wiggins, when he went to England in 1937, to look for the actual type of the species in Sir James Edward Smith's herbarium, filed with The Linnean Society of London. Dr. Wiggins was successful in finding the types of both *Sclerocarpus gracilis* and *S. exiguus*, and I am very grateful to him for giving us notes upon the specimens and for arranging to have the types photographed.

The type specimen of *S. gracilis* is labeled: "West coast of North America. Mr. Menzies. 1803. Sclerocarpus—nov. sp. Menzs. gracilis." The date given is erroneous, for Menzies returned to England from the west coast of America for the last time in 1795. Thus the slight clue as to where the specimen was collected that a correct date might have afforded is lost. We are only safe in assuming that the plant (from its condition probably collected in late spring or early summer) was taken along the coast somewhere between Nootka Sound, Vancouver Island, and Trinidad, Humboldt County, California. Menzies apparently collected no farther inland than Fort Vancouver, on the Columbia. His visits to the central California coast were at the wrong seasons to collect either of these *Madiae*.

The present note is given to authenticate properly a necessary name change in one of the most common tarweeds—a name that has already appeared in print and for which there is additional need.

Carnegie Institution of Washington,
Division of Plant Biology,
Stanford University, California,
November 30, 1939.

REVIEWS

Flora Taxonomica Mexicana. By PROFESSOR C. CONZATTI. Pp. 1–67. Oaxaca de Juarez. Mexico. 1939. Price $1.00 (five pesos), obtainable from the author, 2a de Gomez Farias, 3 Oaxaca de Juarez, Oaxaca, Mexico.

Volume I, containing introductions and keys to the families of vascular plants (part 1), and the Pteridophyta (part 2) is published in 1939; and for sale by the author. The edition is of but 300 copies. Seven more volumes, carrying the work through Umbelliferae, are ready for publication. It is recalled that Conzatti and Smith published a similar work in 1895 covering a large part of the Sympetalae.

In this volume, *Polypodium oaxacanum* Conzatti (p. 94) is described, in Spanish, as a new species. So also are *Goniophlebium stramineum* Und. (p. 105), *Ophioglossum Pringlei* Und. (p. 141), and *Dryopteris Maxoni* Und. (p. 19), described from specimens bearing these names in the author's herbarium; the last is really *D. Maxoni* Und. and C. Chr., with a different type. *Notholaena brachypoda* Maxon (p. 72) also appears for the first time with a description.

New combinations are: *Phlebodium astrolepis* (Liebmann), p. 100; *P. polylepis* (Roem.), p. 101; *P. erythrolepis* (Weatherby), p. 101; *P. Conzatti* (Weatherby), p. 101; *Goniophlebium laevigatum* (Cav.), p. 103; *G. fraternum* (Cham. y. Schl.), p. 104; *G. Collinsii* (Maxon), p. 106; *G. Rosei* (Maxon), p. 107; *Phymatodes angusta* (Mett.), p. 109 (this error traces back through Rovirosa to Hooker; this is the type species of *Pleopeltis*); *P. Palmeri* (Maxon), p. 109; *Dicranopteris pubescens* (H. B. K.), p. 129. *Poecilopteris repanda* (Bl.) Presl is reported from Oaxaca on the author's identification.

The author has, and has used diligently, the publications of Maxon and Weatherby. For older records, he seems to have been dependent upon Rovirosa (based in turn on Synopsis Filicum); directly upon the Synopsis Filicum of 1873; and upon Moore's Index of 1857–'60. Except where Maxon's work has guided him in modern practice, his genera are Moore's. As just one result of the use of these most divergent guides, *Pteridium caudatum* (L.) Maxon appears under *Pteridium,* but *Pteris aquilina* and *P. laciniata,*—type species respectively of *Pteridium* and *Lonchitis* (and *Anisosorus*),—are included in *Pteris.*

Professor Conzatti's ambition to assemble and arrange in one work the widely scattered publications on the rich flora of Mexico, and to present this in the language of Mexico for Mexican use is merely appreciative of an urgent need. He brings to it a long half-century of devotion. His style is a happy combination of scientific brevity and literary ease. It is no less than a tragedy that his resources and facilities are incommensurate with his industry and zeal.—E. B. Copeland.

Plants of Crater Lake National Park. By Elmer I. Applegate. The American Midland Naturalist. Vol. 22, No. 2, pp. 225–314, 3 plates. 1939. Price fifty cents, prepaid; a few copies obtainable from Dr. Theodor Just, Editor, The American Midland Naturalist, University of Notre Dame, Notre Dame, Indiana.

Mr. Applegate has successfully brought to publication a comprehensive account of a flora with which he has been closely concerned for more than four decades. Crater Lake National Park, once an area of intensive volcanic activity, lies athwart the main axis of the Cascade Range in southern Oregon. Its one hundred square miles embrace coniferous forests, moist meadows, timberline conditions, pumice "deserts," sheltered canyon bottoms and the precipitous rocky cliffs of the Rim. Species characteristic of the Transition, Canadian and Hudsonian life zones all occur within its limits, and the thousand-foot walls of the caldera in which Crater Lake lies, present remarkable instances of zonal nonconformity.

Because of the position of the area and its diverse habitats, migration lanes have been open from the Columbia plateau, the humid region to the west of the Cascades, and the ancient Klamath-Siskiyou mountain mass lying to the south. The catalogue includes a total of some 570 species and subspecific entities from within the boundaries of the park, of which about a dozen are thought to be endemic. The list is based primarily upon the author's own collections. Of these, one set is preserved in the Dudley Herbarium of Stanford University, where it will be permanently available for consultation; a second set is to be housed at Crater Lake.

The introductory portion of the paper includes a brief ecological description of the park, some interesting notes on the author's explorations of its flora and a partial bibliography of pertinent writings. The taxonomic account is equipped with complete but non-technical keys throughout. Each entity (with the exception of the species of *Carex*) is provided with a few descriptive phrases, to facilitate identification, and full details regarding its known localities of occurrence and characteristic habitats.

The author's taxonomic treatment is predominantly conservative, and simple trinomials have been employed to avoid the necessity of either admitting subspecies in some genera and varieties in others, or else of making extensive changes in status to achieve uniformity. The determinations of specialists have afforded some guide posts for the recognition of species in difficult groups, but the paper is entirely Mr. Applegate's own work. He suggests that some name-alterations may be necessary, a prophecy the future will probably confirm, since even one tautonym has slipped into the catalogue.

The writer has not only given an excellent account of the interesting flora of the southern Cascade Range, but has simultaneously provided his native state with its most complete local flora.—L. Constance.

Keys to the Phyla of Organisms, including Keys to the Orders of the Plant Kingdom. By Fred A. Barkley. Privately published by the author, and for sale by the Associated Students' Store, Montana State University, Missoula, Montana. Pp. 1–39. November, 1939. $.75.

The keys in this publication are especially designed to aid the student of plant morphology, and from the manner in which they have been compiled they should admirably serve the purpose. The first key, to the phyla of organisms, orients the student as to the organization of the living world, with its four kingdoms (following recent proposals of Dr. Herbert Copeland), eleven divisions, and forty-six phyla. There follow twenty pages of keys to the orders of the various plant phyla. The author states that these keys were assembled especially from the writings of C. E. Bessey and J. H. Schaffner, but the attempt was made to reflect the views of other authorities. The appended glossary and selected bibliography add much to the utility of the work, which has been attractively printed on rag paper with the pages broader than high to facilitate the presentation of the dichotomous keys. This utilitarian compilation deserves a wide popularity among botanists.—D. D. Keck.

An Illustrated Manual of California Shrubs. By Howard E. McMinn. Pp. 1–689, 175 figs. J. W. Stacey, Inc. San Francisco. 1939. $5.00.

The prominent place occupied by the shrub in the vegetation of California, throughout the broad expanses of chaparral, the brush associations of the forest floor, the gullies and the sea coast, makes it especially appropriate that this body of plants should receive such an excellent treatment at the hands of one who may well be called a specialist in this type of plant cover. Shrubs comprise about twenty per cent of the seed plants of this area and are so grouped into characteristic associations as to render them a well-defined unit of the flora. It is not to be expected that any author can delimit, to the satisfaction of all, the concept of what constitutes a shrub. Such delimitation must be, by its very nature, somewhat arbitrary. The present work includes all those forms "classified as woody perennials and semi-woody plants except trees and the succulent-stemmed plants of the Cactus Family. About eight hundred species and two hundred varieties of native shrubs, woody vines, subshrubs, woody cushion plants and halfshrubs have been recognized."

The introduction contains a brief statement on the naming of plants, the phylogenetic and ecological bases for classification, a discussion and classification of the shrub areas of California and a concise survey of the gross morphology of seed plants. In the classification of shrub types in the area concerned the following categories are admitted: desert shrub, Great Basin sagebrush, deciduous shrub, chaparral; all of which are termed "formations." The alpine and subalpine shrubs are treated under the heading, "the lesser shrub areas."

There are two separate keys, one to the genera, the other to the families. It is unusual to find the key to genera preceding the key to families; such an arrangement renders the latter key somewhat superfluous. All the keys are carefully prepared, based on obvious rather than technical characters, and have been thoroughly tested. They are, therefore, eminently practical and easy to use. The descriptions are unusually full and complete and are provided with valuable supplementary information on biology, use and range. The work is profusely illustrated with pen drawings and photographs. Most of the drawings are from the skillful pen of Emily Patterson Thompson. The design on the cover is the fruit of *Crossosoma californicum.*

The family name at the top of each page would have been much more useful than the running head "Angiospermae." As it is, the running head does not assist one in gaining familiarity with the organization of the book. In the interest of consistency, the only subspecific category recognized is the variety. Such a policy calls for nomenclatorial changes that assume the terms "variety" and "subspecies" to be synonymous. It is conceivable that taxonomic concepts may be such as to render these terms synonymous in many cases, but the International Rules of Botanical Nomenclature definitely regard the variety as subordinate to the subspecies. The indiscriminate use of these two categories by many American botanists has made it very difficult for the writer of a general treatise, such as the one under consideration, to be consistent in the matter of usage. It would be very advantageous if the Rules would make specific mention favoring the use of simple trinomials for such a work as this, thus eliminating the necessity of designating the rank of each entity. In a very few cases, the names used are not in accordance with the International Rules, evidently due to oversight resulting from changes made in the rules during the time the work was being assembled.

The closing twenty-five pages comprise a valuable section dealing with the use of native plants as ornamentals. This portion of the volume was prepared by Fred H. Shumacher, of the United States Forest Service. To a community that has suddenly awakened to the landscape values to be derived from the native flora, this chapter should serve a very useful purpose. A classification has been prepared which is based upon landscape utility, and lists of plants are provided for each purpose.

One cannot congratulate the author on so fine a book without also complimenting the printer for such an excellent example of the book printer's art. The typography is remarkably fine and the illustrations very clear. This beautifully prepared book will make a highly desirable addition to the libraries of professional botanists, but it will be no less sought after by those whose chief interest in plants springs from a love of cultivating them. Professor McMinn has been eminently successful in bridging the gap between the technical needs of the practising botanist and the interests and questions of the amateur plant student and gardener.—Herbert L. Mason.

NOTES AND NEWS

Mr. Louis F. Henderson of the University of Oregon, Eugene, has recently retired from active service. Mr. Henderson, a pioneer botanist of the Pacific Northwest, had been Curator of the Herbarium since 1925. Previous to his connection with the University of Oregon he was Professor of Botany at the University of Idaho, Moscow.

The following recent appointments are of special interest to botanists of western North America: Dr. Norman Boke, Department of Botany, University of California, Berkeley; Dr. F. R. Fosberg, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C.; Dr. George Neville Jones, Department of Botany, University of Illinois, Urbana; Dr. Marion Ownbey, State College of Washington, Pullman; Dr. Louis Wheeler, University of Missouri, Columbia.

The veteran collector and student of Philippine plants, A. D. E. Elmer, has just published article 136, continuing Volume X of his "Leaflets of Philippine Botany," pages 3673 to 3810. This "article" or number contains very full descriptions in English of 103 new species of flowering plants. The author announced in 1937 that the publication will close with Volume X. It represents thirty-five years of hard and efficient work under difficulties not likely to be appreciated by any who have not tried to work under similar conditions. The plants and the publication may be obtained from the author, Manila, Philippine Islands. The most complete set of his plants is understood to be in Dudley Herbarium, Stanford University.—E. B. Copeland.

PROCEEDINGS OF THE CALIFORNIA BOTANICAL SOCIETY

January 19, 1939. Meeting, Room 2093, Life Sciences Building, University of California, Berkeley, at 8: 15 p. m. The President, Professor H. E. McMinn, occupied the chair. The following officers were elected and installed: President, Professor H. E. McMinn; First Vice-President, Dr. Ira L. Wiggins; Second Vice-President, Dr. Carl B. Wolf; Treasurer, Dr. David D. Keck; Secretary, Dr. Lincoln Constance. Professor William W. Mackie, of the California Agricultural Experiment Station, gave an illustrated address on "The Origin of the Lima Bean." The transmission of the culture of lima beans was traced throughout northern South America, Central America, the West Indies, Mexico and the southern United States, probably from the vicinity of Peru.

February 16, 1939. Meeting, Administration Building of the Regional Park Service, Lake Temescal, Oakland, at 8: 00 p. m.

The President, Professor H. E. McMinn, occupied the chair. Mr. Elbert Vail, Manager of the East Bay parks, spoke to the Society on the origin, development and future plans of the East Bay park system. Professor McMinn and Mr. A. E. Wieslander led an informal discussion of the general subject of "chaparral," illustrated with numerous specimens of Californian shrubs, particularly of *Ceanothus* and *Arctostaphylos*.

March 23, 1939. Annual Dinner, Mary Morse Hall, Mills College, Oakland, at 6 : 30 p. m. The President, Professor H. E. McMinn, presided. The Society was welcomed to the campus by Dr. Aurelia Reinhardt, President of Mills College. President McMinn responded on behalf of the assembled botanists. Dr. Robert C. Miller, President of the California Academy of Sciences, briefly introduced the main speaker. The address was given by Miss Alice Eastwood, Curator of Botany, California Academy of Sciences, San Francisco, on, "The Place of the California Academy of Sciences in the History of Western Botany." The fascinating reminiscences of Bolander, Brewer, Behr, Kellogg, Harkness, the Brandegees, and others, were illustrated by their portraits and by early pictures of the Academy. An excellent display of native and cultivated plants was on view in a room adjoining the lobby after the conclusion of the dinner.

October 19, 1939. Meeting, 2093 Life Sciences Building, University of California, Berkeley, at 8 : 15 p. m. The President, Professor H. E. McMinn, occupied the chair. Mr. E. K. Balls, botanical collector for the Royal Botanic Gardens, Kew, England, spoke on, "Plant Collecting in the Near East." The account of his extensive botanical travels in Turkey, Greece, Persia and Morocco was illustrated with exceptionally fine lantern slides.

November 30, 1939. Meeting, 2093 Life Sciences Building, University of California, Berkeley, at 8 : 15 p. m. The President, Professor H. E. McMinn, occupied the chair. Professor E. B. Babcock, chairman of the nominating committee, submitted the names of the following candidates for officers of the Society: President, Dr. Ira L. Wiggins; First Vice-President, Dr. G. Ledyard Stebbins, Jr.; Second Vice-President, Dr. Carl Epling; Treasurer, Dr. David D. Keck; Secretary, Dr. Lincoln Constance. A motion, made and seconded to accept the report of the nominating committee and to close the nominations, was passed unanimously. Dr. Kenneth F. Baker, Division of Plant Pathology, University of California, Berkeley, spoke on, "Exploring for Wild Pineapples in Eastern South America." The lecture, beautifully illustrated with kodachrome slides, dealt with the wild pineapples and with the place of origin of the cultivated types. The region particularly concerned, southwestern Brazil and Paraguay, was admirably depicted.—L. Constance, Secretary.